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THE DEVELOPMENT OF A TAXONOMY FOR THE CLASSIFICATION OF TEACHER CLASSROOM BEHAVIOR.

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AN ATTEMPT WAS MADE TO DEVELOP A TAXONOMY FROM A SYNTHESIS OF PREVIOUS APPROACHES TO THE DESCRIPTION AND CATEGORIZATION OF TEACHER CLASSROOM BEHAVIOR. INVESTIGATORS FOUND THAT THE VARIETY OF VIEWPOINTS COULD NOT BE SYNTHESIZED INTO ONE SINGLE SYSTEM. HOWEVER, SOME OF THE CATEGORIES, APPROACHES, AND CONCEPTUALIZATIONS FROM PREVIOUS EFFORTS PROVIDED INSIGHTS FROM WHICH A TAXONOMY WAS EVOLVED WHICH CAN BE USED FOR EMPIRICAL DESCRIPTION OF GROSS AND MIDDLE-RANGE LEVELS OF TEACHER BEHAVIOR. THE TAXONOMY AND RELATED PARADIGMS WERE EMPIRICALLY TESTED IN 30 OBSERVATIONS OF CLASSROOM BEHAVIOR RANGING FROM THE FIRST GRADE THROUGH A COLLEGE GRADUATE COURSE. THE TAXONOMY WAS SUBSEQUENTLY MODIFIED. VALIDATION OF THE FINAL TAXONOMY WAS CONDUCTED WITH FILMED SEQUENCES OF SPONTANEOUS CLASSROOM BEHAVIOR WHICH WERE EVALUATED AT TIMED INTERVALS, AS WELL AS WITH OBSERVATIONS OF LIVE CLASSROOM TEACHING. (JM)

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Cooperative Research Project No. 2288

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F.R.C.

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CHAPTER I

INTRODUCTION

Currently there is intense concern about the adequacy of the preparation provided for teachers through existing programs of teacher education. There is dissatisfaction with teacher preparation in general, a feeling that the substance of professional education has been only superficially identified; that such substance is poorly organized; that the content and procedures frequently have no demonstrable relevance to the acts of teaching.

The existence of these conditions is explained in part by the practice of generating teacher education curriculum and method on logical grounds without explicit reference to a clear understanding of teacher behavior in the classroom. Future improvement in educational practice is likely to be proportional to the success of efforts to develop a common core of professional substance directly related to teaching performance skills.

It is far more simple to identify a problem that exists than it is to devise a plan of action to do something about it. There is no formula available on which educational improvement can proceed with assurance of success. In the search for better ways of advancing knowledge, certain arbitrary definitions must be imposed by those who assume responsibility for conducting needed research. Assuming that the classification of knowledge represents the imposition of some schema, derived by human beings, on a selected body of content chosen from a larger available body of knowledge, and that the bases for derivation and selection relate to certain philosophical conceptions, it is immediately apparent that there is no one route to improvement. The justification of the approach chosen must rest initially on the face validity of the arbitrary inclusions and exclusions and in the process selected.

A first essential step is to identify a focal concept that might provide a base for the disciplined study and development of education. What concept holds promise for yielding a base for the substance of teacher education which is demonstratively relevant to actual teaching? The nearly self-evident response is--the teaching task itself! It is recognized that past efforts to analyze the job of the teacher have not provided sufficient content for teacher education, but these partially unsatisfactory results may have derived from the vantage point employed to analyze the job of the teacher rather than from any inherent weakness in the notion that the teaching task should provide relevant cues to the substance of teacher education.

One of the major difficulties to be overcome is the identification of those behaviors in classroom teaching which can form a foundation for the development of teacher education programs. Smith has stated,

> The question of what knowledge is relevant to the control of teaching behavior is an empirical one, because teaching is a natural social phenomenon. It has its own forms, its own constituent elements, its own regularities, and its own problems. It takes place under a stable set of conditions--time limits, authority figures, systems of knowledge, social structures, psychological capacities, etc. If we would understand teaching and thereby gain control over it, we must first study it in its own right. (Smith, 1961, p. 2.)

Assuming this position to be valid, it seems reasonable to believe that critical teacher behaviors can be identified and translated into specific curricular experiences necessary for their development.

Teacher behaviors or teaching performance tasks are set forth as the vantage point and the focal point for this research effort. The approach is based on what teachers do--the kinds of behaviors they exhibit when engaged in the acts of teaching. The purpose of the approach was to develop operational definitions of such acts and to develop a taxonomy of teacher behaviors.

A variety of scholars have studied the dynamic interactions which exist between a number of aspects of the teaching-learning situation and the teacher. Recent advances in research on classroom behavior have provided a base on which the classification and description of teacher behaviors can be projected. The fact that these studies have been successful in delineating selected, though sometimes narrowly defined, facets of the classroom situation indicates that a combination of those researches, their findings, and their viewpoints might produce a knowledge synthesis embodying the advances made by the separate studies. A synthesis might provide a more complete understanding of teacher behavior than can be derived from any single effort. This project attempted to develop a taxonomy of teacher classroom behaviors based on the results of the several individual research efforts conducted both within teacher education and in closely allied disciplines. The value of such an undertaking is that this synthesis ultimately might have important implications for the development of a content and approach in programs of teacher education that would be more relevant to the acts of teaching. Only after an identification and description of essential teacher performance behaviors has been made, can their translation into specific curricular experiences basic to the development of teaching skill by prospective teachers become possible.

This study was an attempt to develop a means for describing all observable teacher behaviors. It was procedural and descriptive in nature, not introspective or evaluative. No attempt was made to analyze a given teaching approach. The effort did not give attention to such factors as conceptions about effectiveness or desired dimensions of teaching. Rather the study was undertaken to develop and validate instrumentation that could be employed in future research efforts in gaining knowledge and understanding about the phenomenon of teaching.

The Objectives of the Study

The central objective of the study was to develop a taxonomy for the classification of teacher classroom behavior. More specifically, the purposes were:

(1) To describe and synthesize the efforts which have been made in the field of education in analyzing teacher classroom behavior.

(2) To develop a taxonomy of teacher classroom behaviors which accounts for the observable dimensions of interaction in the classroom.

(3) To test empirically the sufficiency of the taxonomy.

CHAPTER II

ANALYSIS OF RELATED RESEARCH

While the art of teaching is of ancient lineage, a systematic approach toward gaining understanding of the nature and complexities of teaching is still lacking. Today, conceptions about teaching consist essentially of scattered ideas, theoretical speculations about teaching and learning, pedagogical opinion and folklore, and untested assumptions about the function of the teacher in classrooms. Historically, any field of human endeavor has developed only as research findings and empirical knowledge provided a foundation on which to build. Efforts to examine selected aspects of the educative process abound and have done so for many years, but how, if at all, do these efforts relate to the development of an adequate understanding of teaching? There is no one accepted explanatory theory of teaching or any satisfactory set of models to conceptualize teaching and its effect upon learning.

No approach to research on teaching has been used more persistently during the last fifty years than the analysis of teacher personality characteristics and their relationship to teaching effectiveness. Studies falling into this category are so numerous that individual description and reporting is impossible. Two excellent bibliographies by Domas and Tiedeman (1950) and Barr (1961) report well over 1,000 such studies. After years of extensive effort to relate teacher personality traits to teaching, most of the results still remain in a theoretical state. Additional refinement and verification would be required before the conceptual and experimental limitations of this type of research could be overcome.

Ryans' (1960) massive Teacher Characteristics Study represents a more recent effort to understand teacher performance skills. While this work aroused great interest in the study of teachers and teaching, it did not provide the essential basic concepts around which the long-range development of a science of teaching could be constructed. After an analysis of numerous studies of teacher characteristics, Getzels and Jackson (1963) concluded:

> Despite the critical importance of the problem and a half-century of prodigious research effort, very little is known for certain about the nature and measurement of teacher personality, or about the relation between teacher personality and teaching effectiveness. The regrettable fact is that many of the studies so far have not produced significant results. Many others have produced only pedestrian findings. For example, it is said after the usual inventory tabulation, that good teachers are friendly, cheerful, sympathetic, and morally virtuous rather than cruel, depressed, unsympathetic and morally depraved. But when this has been said, not very much that is especially useful has been revealed. For what conceivable human interaction--and teaching implies first and foremost a human interaction--is not the better if people involved are friendly, cheerful, sympathetic, and virtuous rather than the opposite? What is needed is not research leading to the reiteration of the self-evident, but to the discovery of specific and distinctive features of teacher personality and of the effective teacher. (p. 574.)

Other efforts have been focused on school organizational factors; sociologists have contributed concepts of role in describing individual behavior within social systems; psychologists have documented the importance for learning of such concepts as retention or transfer of cognitive structures. Most of the research of this type has not as yet been concerned directly with teacher behavior. Rather, it has dealt almost exclusively with learning materials or content and behavior of individuals in groups. Thus, it is necessary to extrapolate from such research any inferences about teacher behavior.

Within the past decade or so there has been a shift in the direction of educational research on the part of some investigators. The focus of inquiry has become, for them, what actually happens in classrooms and attempts have been made to describe, through systematic analysis, what a teacher does and how he behaves while teaching. Several groups have viewed teacher behavior in terms of roles played and functions performed. They are interested primarily in what goes on in classrooms when teachers and students are face to face. Careful examination of these factors are crucial in gaining an understanding of educational processes.

Since interest in descriptive research on teaching has been initiated, several experimental studies that involve the observation of classroom teaching have resulted in the development of instruments for the analysis of teacher behavior. The result is that there is now available a variety of instruments for analyzing a teacher's classroom behavior. While these studies all reflect, in some ways, a common research orientation, they also tend to differ widely in other aspects. The instruments reflect the investigator's philosophical, psychological, and/or sociological orientation. Teaching behaviors are categorized in different ways depending upon what the individual researcher holds to be important about teaching. Each has an implied theory instruction although that theory is seldom presented in explicit terms.

The common perception shared by all of the recent investigators of teaching behavior is that increased understanding of the processes of teaching can be gained by observation of the classroom in action. This common perception does not preclude, however, radical differences in such variables as which teacher behaviors were observed and recorded, the subject matters being taught, the grade level observed, conditions within classrooms used for data gathering, observational procedures, and techniques or methodologies employed in the processes of teaching. The decisions made by the several investigators about these variables reflect the basic interests and concerns of those who made them. Therefore, it is impossible at the present time to integrate the research efforts into any one adequate system for the observation and classification of teacher behaviors.

Systems of classification developed thus far can be divided roughly into three major categories--(1) those dealing with psychological climate or classroom interaction; (2) those dealing with attempts to measure classroom behavior per se, to describe quantitatively what goes on in classrooms; and, (3) those dealing with substantive objectives or cognitive aspects of teaching-learning. While there is a degree of overlap among the studies to be discussed, they will be analyzed within this grouping with the recognition that overlap exists.

Studies of Psychological Climate

Historically, teacher leadership in the classroom has been conceptualized with respect to polarized models, dominative versus integrative, authoritarian versus democratic, teacher-centered versus learner-centered, direct versus indirect. Proceeding from the early studies of Anderson and Lippitt and White to the more definitive work of Withall and Flanders, efforts have been devoted increasingly toward identifying and analyzing teaching styles that are observable in the classroom. Through the use of various approaches, researchers have been able to measure more precisely certain teacher verbal behaviors. Although instruments are available which yield greater precision to the appraisal of teacher behavior empirically, the polarization of teaching styles remains on a theoretical level. But why should teacher behavior be dichotomized theoretically and classified empirically into an either/or model of behavior? Realizing that teaching is a complex process, then teaching style is also complex and therefore subject to the many variables which effect changes in teacher-learner behaviors. It is reasonable to assume that time allocated for a lesson, the particular instructional goals for the lesson, the immediate pupil response pattern, and all the varied conditions which are functional to the dynamics of a classroom come into play, changing the modal teaching pattern. Therefore, variability within the modal teaching style may be a component of teaching in action although the degree of flexibility varies with individual teachers. One might speculate that a teacher who uses indirect and direct teaching strategies may deviate significantly from his normative behavior if the immediate situation demands a change in teaching behavior in order to accomplish the instructional goals of a particular lesson or at a particular time.

The dimension of teacher classroom behavior referred to here as psychological, or classroom climate, has received more attention than perhaps any other facet of classroom interaction. There are differences in the terms applied to this dimension as defined by the various investigators. But there is little question that each of the studies refers to a similar and sometimes identical dimension of behavior which can be measured reliably. Most of these efforts have grown out of a concern for the identification of effective teacher behaviors or the social psychologist's interest in the process of interaction within the classroom.

Classroom Climate.--The choice of observational procedure used by an investigator either limits or expands the degree of complexity of a system for the analysis of classroom behavior and thus, limits or expands the amount of data collected in a given study. Most of the studies of classroom climate have used direct observational procedures in selected classrooms where teaching is going on and, therefore, restrict the basic source of data to the verbal behaviors of teachers. Written records of teacher statements or on-the-spot categorization of teacher behaviors employing some instrument have supplied the data in the majority of these investigations.

Most of the studies of psychological climate trace their origin to the work of Anderson (1945, 1946, 1959) and his colleagues where classroom climate was defined in terms of the dominative or integrative acts of the teacher. Two major hypotheses resulted from these efforts. The hypothesis of the growth circle which states that socially integrative behavior in one person tends to induce socially integrative behavior in others, and the hypothesis of the vicious circle which states that dominative behavior in one person tends to incite domination and resistance in others. Research over several years led to these conclusions:

> Integrative behavior in one child induced integrative behavior in the companion, domination incited domination, integration and domination were psychologically different. (1959, p. 132)

> The data confirmed the hypothesis that integration in the teacher induces integrative behavior in the child. Moreover, children with the more dominating teacher showed significantly higher frequencies of nonconforming behavior, directly supporting the hypothesis that domination incites resistance. The behaviors of children also supported the further hypothesis that severe domination produces not resistance but submission and atrophy. (1959, p. 136)

A parallel line of research was begun at about the same time by Lippitt and White (1943) who conducted laboratory experiments of democratic, authoritarian, and laissez faire patterns of leadership employed by teachers in school-sponsored club activities. In general, "democratic" patterns were defined in a manner similar to Anderson's "integrative" behaviors, while the "authoritarian" leadership of Lippitt and White represented the equivalent of Anderson' s "authoritarian" behaviors. Anderson had no equivalent for the "laissez faire" pattern. The conclusions of these two lines of research tended to confirm one another. The incidence of aggressive learner behavior in the autocratic groups was either very high or very low when compared to the democratically taught groups. In those autocratic groups where student agression was low, it showed a marked increase when the teacher left the room. When the leader was in the room, the work output of students was about the same for the democratic and the autocratic groups, but when the leader left the room, there was a significant drop in work output in the autocratic groups but little change in output in the democratic groups.

Following the establishment of the concept of the importance of social or psychological climate in teaching, Withall (1949, 1952) demonstrated that the verbal statements of teachers could be classified into categories for measurement and analysis. He developed a set of seven categories, similar in nature to Anderson's dominative-integrative ratio, called the "Social-Emotional Climate Index." It was comprised of criteria whereby teacher statements were distributed as follows: (1) learner-supportive statements or questions, (2) acceptant or clarifying statements or questions, (3) problem-structuring statements or questions, (4) neutral statements evidencing no supportive intent, (5) directive statements or questions, (6) reproving, disapproving or disparaging statements or questions, and (7) teacher-supportive statements or questions.

Withall concluded that when the teacher-centered pattern was sustained it produced anxiety which was disruptive and the students' subsequent ability to recall the material was reduced. He found the reverse was true in student reactions to learner-centered teaching. From these conclusions, certain value-judgments about inter-personal relationships were evolved.

(1) Dependency of the learner upon the teacher is undesirable.
(2) Giving opportunity to the learner for free choice is desirable.
(3) Verbal expression of understanding by the teacher facilitates problem solving.

Further conclusions were that there is a consistency in the kind of atmosphere the same teacher creates in his classroom over a period of time and that as few as fifty statements of a teacher would differentiate between the climates of two specific activities, although generalization to other situations would probably not be warranted.

It is interesting to note that Withall's system of analysis was not intended to be used as a means of recording classroom behavior *per se*, but to provide a method of coding transcripts of sound recordings of classroom behavior.

Using the Withall technique, Perkins (1951) found that differences in social-emotional climate produced significant differences in group learning as revealed in the verbal statements made by six groups of in-service teachers participating in an established program of child study. He concluded:

> . . . that an individual's learning and development cannot be treated as a series of discrete and unrelated experiences. It is evidence that the changes in the learner influence and are affected by the total experience. The part played by teacher-pupil relations is extremely significant, for to a greater extent these relations shape the climate of the classroom. Climate appears to be a key ingredient in inter-personal experience, for it will in a large measure determine the learning and satisfaction of emotional needs of groups, outcomes which provide a realization of some of the broader objectives of education. (1951, p. 119)

Also building upon Withall's work, Medley and Mitzel (1959) related emotional climate to several dimensions of teacher effectiveness. They reported positive correlations between emotional climate and reading growth, group problem solving, pupil-teacher rapport, and teachers' self ratings.

These studies of classrooms, emphasizing the importance of the social or psychological climate, have been used in developing the rationale of several more recent complex studies of the psychological climate of classrooms.

The most intensive, long-range research program of the psychological dimensions of classroom teaching has been conducted under the leadership of Flanders (1951, 1961, 1962, 1963). His original investigation (1951) used the Withall formulations and reported that teacher-centered behaviors fostered more negative feelings on the part of students and resulted in higher anxiety and greater concern with interpersonal problems than did student-centered behaviors. Conversely, student-centered behaviors were characterized by a greater concern with learning problems.

Flanders' subsequent research, (1961, 1962) was directed toward describing the effects of teacher behaviors on classroom climate and learning goals. Classroom behaviors were classified through the use of an instrument employing ten behavioral categories. Seven of the ten describe teacher behaviors as: (1) accepts feeling, (2) praises or encourages, (3) accepts or uses ideas of student, (4) asks questions, (5) lecturing, (6) giving directions, or (7) criticizing or justifying authority. The first four he identifies as "indirect" teacher influence, and the last three as "direct" influence. Two other categories describe student behaviors as either (8) student talk-response or (9) student talk-initiation. The last category is used to record (10) silence or confusion. Indirect influence is assumed to expand the freedom of action the student has, afford more opportunity for him to express ideas, and make him less dependent upon the teacher. By categorizing types of behaviors into interaction analysis matrices, the concentration of indirect and direct influence may be determined. From the ratio of the two types of influence, inferences as to the impact of teaching behaviors on students are made.

Flanders (1961) compared the patterns of verbal teacher behavior with seventh grade achievement in mathematics and social studies classes. He found that the verbal patterns of teachers in high-achieving classrooms were significantly different from those in low-achieving classrooms. Teacher behavior patterns that create contrasting classroom climates were summarized as follows:

Indirect Influence Pattern	Direct Influence Pattern
a) accepts, clarifies, and supports the ideas and feelings of students	a) expresses or lectures about own ideas or knowledge
b) praises and encourages	b) gives directions and orders
c) asks questions to stimulate student participation in decision making	c) criticizes or deprecates student behavior with intent to change it

A follow-up study by Flanders (1963) using the implications of direct and indirect influence, was conducted with inservice teacher training. Two roughly matched groups were employed: one group being taught with indirect behavior patterns and the other group with direct patterns. Teachers were differentiated for statistical control as being "more indirect" and "less indirect." It was reported that indirect teachers favored the indirect lessons more and profited most from the training. The same group liked the direct instruction least and profited less from it. While the results of this study cannot be generalized, the results were consistent with Flanders' earlier studies.

This series of investigations was most useful in providing descriptions of the spontaneous interaction between teacher and student and the interplay between different acts of the teacher and the reactions of different types of students. The instrument developed for interaction analysis is relatively easy to use. The system of categories is global in nature, however, and does not have a breakdown of specific behaviors that might be essential in order that relationships between more discrete teacher behaviors and student behaviors can be described and analyzed. The investigators hold that the system of interaction analysis is content free, and note that it is concerned primarily with skills of classroom management expressed through verbal communication. To use the system most effectively is a costly, cumbersome task requiring some form of automation in collecting, tabulating, and analyzing the data.

Assessment of Good Teaching.--A study that paralleled Flanders' was conducted by Hughes and Associates (1959). They, too, analyzed teaching in terms of degrees of control and freedom in the classroom. The research focused directly upon classroom life and analyzed the interaction of teacher and one pupil, a teacher and a group of pupils, and a teacher and a whole class. Primary effort was directed toward defining and describing "good" teaching.

Teaching was defined as the interaction of teacher with children, individually or as a group. Inherent in this definition was the concept of a superior-subordinate relationship between teacher and learner with the power of the teacher as the dominant element in the relationship. This power finds expression in the decisions, rewards, and punishments meted out by the teacher. Since the process of interaction in classrooms is characterized by complexity and change, response or lack of response by the teacher to elements of change have a strong influence on interaction. Therefore, the teacher cannot speak or act in the classroom without performing some function for someone in the situation. The status position of a teacher in relationship to pupils makes all teacher classroom behavior functional in nature.

Hughes' system of categorization was developed from a content analysis of nearly 1,000 written records of actual teaching of some sixty teachers in both elementary and secondary schools. The object of this analysis was to determine the function, for the learners, of the identifiable verbal teaching behaviors. The result of the analysis was the identification of thirty-one functions that teachers performed in classrooms in their interaction with pupils. The primary functions were subsumed under seven major categories of behavior: controlling, imposition, facilitating, content development, response, positive affectivity and negative affectivity.

When the teacher-learner situation was viewed from this framework of interaction, it was found that regardless of the situation, the teacher behaves in one of several ways:

> To control, command, and direct pupils; to impose personal values on pupils;
>
> To ignore, threaten, scold, admonish, punish, and other indices of disapproval;
>
> To act in a relatively neutral manner to facilitate what is going on;
>
> To act within the framework of a problem or content under consideration to clarify, elaborate, evaluate, or serve as resource in answer to pupil's questions;
>
> To respond in a personal manner to pupils on matters other than those centered in the content or problem on which the class is working;
>
> To offer approval, praise, commendation, acceptance, and encouragement.

Hughes concluded that these functions hold true for any superior-subordinate relationship.

The basic data of the study were three, 30-minute records of teaching secured on thirty-five elementary school teachers, twenty-five of whom were "judged good" by the county staff that served as consultants to a large county school system, and ten teachers considered "representative" of a single large school within the same system. The specimen record of teacher behavior was a written, detailed, sequential narrative of 30 minutes of teacher behavior as recorded by two skilled observers.

All recorded behavior was categorized according to its function in relationship to the situation of which it was a part, and a model pattern for teacher behaviors for the elementary school was developed. The model was based on the frequencies of teacher acts falling into the major categories of the instrument, and from this Hughes inferred certain qualities of teaching and their impact upon students. "Good" teaching was represented by patterns of behavior falling within the following limits:

Controlling Behaviors	20-40 per cent	
Imposition	1- 3 per cent	of
Facilitating Behaviors	5-15 per cent	total
Content Development Behaviors	20 40 per cent	teacher
Personal Response Behaviors	8-20 per cent	behavior
Positive Affectivity Behaviors	10-20 per cent	
Negative Affectivity Behaviors	3-10 per cent	

Hughes found no significant differences between the rated "good" teachers and the "representative" teachers; however, when the thirty-five were ranked in three groups according to deviation from the mean of the six teaching records most like the model of good teaching, there were significant differences between the "good" and "poor" groups. The two groups differed in controlling functions, developing content, personal response and negative affectivity. No differences in groups were discovered on positive affectivity. Dominative functions were used excessively by all teachers.

Hughes clearly established that it was possible to describe many of the complexities of teaching by direct observation of classroom behavior. Through the use of a rather complex instrument, more specific descriptions of some dimensions of teaching were provided. Her findings represent some interesting hypotheses that require further investigation before their validity can be clearly established. Only the teacher's actions were analyzed, despite the fact that the system for classification was developed from a framework of the learners' perceptions of the functions of a teacher's behavior. Since the major categories of function did not discriminate between "judged good" and "representative" teachers, it is possible that the categories were not refined to the point that they could be used by others. Nevertheless, the work successfully described a wider range of classroom teacher behaviors than any previous investigation. It also provided additional data concerning the relative importance of directive and integrative teacher behaviors. For example, it indicated that a higher percentage of controlling acts by the teacher tends to limit pupil cognitive activity to memory and recall, while a higher percentage of behaviors identified as content development implied that mental processes other than recall and memory were being developed.

Quantitative Descriptions of Teaching

Other studies have made an attempt to measure teacher classroom behavior as such, to describe in quantitative terms as much as possible of what goes on in the classroom without reference to the relationship of behavior to teacher effectiveness or to any psychological theory. These studies have relied heavily upon those of classroom climate but have attempted to measure differences in classrooms without regard to the effectiveness component.

OScAR.--The work of Medley and Mitzel has spanned a period of ten years. It is centered essentially upon the development of an instrument which they call Observation Schedule and Record, or "OScAR", which is a means of quantitatively recording data regarding teacher behavior. The original work grew out of a desire to be able to observe and record behaviors objectively. It was undertaken as a part of a development of observational techniques to be used in studying the performance of beginning teachers who were graduates of the New York City Municipal College System.

The initial effort of the investigators represented an adaptation of the work of Cornell and his co-workers and of Withall's Social Emotional Climate Index. OScAR evolved by modifying and combining items constructed by Cornell and Withall on the basis of the results of tryouts of these two techniques. The system of classification originally emphasized the emotional climate and social organization components of classroom behavior. Through the years OScAR has been modified several times as extensive experience with it has dictated. An important addition to the dimensions of teacher behavior measured was that of verbal emphasis. This dimension, combined with emotional climate and social structure, produced a reliable measure of relatively global teacher behaviors.

The OScAR scales were designed for use by a single observer visiting a classroom by himself. The system enables the observer to see, to hear, and to record as much of what is going on in the classroom as possible. No weighting or importance is attached to the various teacher behaviors as observed, the three dimensions measured represent what are probably the most obvious of differences that can be observed in classes, and the system of categories yields measurement of several dimensions of behavior along which different teachers can be discriminated successfully.

Needs of Teachers.--Travers, Wallen, and others (1961) attempted to relate the measured needs of elementary school teachers to their behavior in the classroom. Four needs were identified and isolated for study--the achievement need, the affiliation need, the need for control, and the need for recognition. A projective instrument designed to measure these four needs was developed by the investigators. In addition, a test of personal preference for educational objectives was designed to measure the needs of teachers by determining the educational objectives which they endorsed. A third instrument administered to each of the teachers was a test of reactions to educational situations, a test designed to measure teacher needs by asking the subjects to evaluate the responses of teachers to various situations that arise in relation to pupils within a classroom. The teacher preference schedule, a device developed by Stern and Masling (1958) and built around the concept that teacher needs are important determinants of teacher behavior, was also used. A self-rating scale was developed which called for self-ratings with respect to thirty characteristics.

Each of the teachers included in the study was given the above scales in an attempt to predict teacher behavior that would be observed in classrooms. A specific purpose of the investigation was to attempt to discover the relationship between the four identified needs of teachers and the related categories of behavior in a classroom.

Two devices were designed for recording teacher behavior. First, a teacher statements technique was adapted from one already developed by

Withall (1949). This technique involved the systematic sampling of the verbal behavior of the teacher. The statements of the teacher thus collected were classified into categories from which scores were derived indicating the extent to which the teacher was achievement-oriented, showed affiliation and controlling behaviors, and the extent to which he occupied himself with management activities in teaching. A rating scale was developed for recording the observer's assessment of characteristics of the behavior of a teacher in the classroom.

A quantification of the behaviors of teachers while teaching indicated the following: (1) the most frequently occurring behavior was that of telling the pupil what to do; (2) the next most frequently occurring form of teacher behavior was that involved in a questioning process; (3) the third most frequently occurring form of behavior outside of performing management functions was that of providing information.

An important result of this work was its direct concern with the behavior of teachers as it was observed. The researchers cautioned against inferences of inner psychological processes as an aid to understanding, or for the purpose of arriving at, variables observed. Such postulated processes, they claim, must be recognized as highly hypothetical in nature. They reached some essentially pessimistic conclusions. In examining variables which have been considered by educators to bear an important relationship to pupil learning there were great variations in the magnitudes of the correlation coefficients.

An important conclusion was, that if one desires to predict typical performance of a teacher under conditions which are familiar to him, the best prediction will result from tests which ask him, in effect, how he behaves in such situations.

While in general, the work was carefully executed, the instruments used in the study received no systematic tryout prior to their administration in the research. The investigators had great difficulty in achieving inter-observer agreement in scoring teacher behaviors. It was assumed by them that the scoring techniques were inadequate. This condition makes it somewhat questionable that the system can be used by others at this time. The work is of significance, however, in that it was an attempt at quantifying certain observed teaching behaviors and attempting to relate such behaviors to the measurement of teachers' needs.

Efforts discussed thus far have had as their main and direct concern quantification and analysis of categories of behavior as observed and not with cognitive aspects of teaching. It is probably accurate to note that the more successful programs of research on teaching behavior thus far have been non-cognitively oriented.

Studies of Cognitive Aspects of Teaching-Learning

Major efforts aimed at general formulations of principles of teaching behavior related to the achievement of cognitive objectives have developed most recently. Those objectives which have been studied are of various kinds--ability to recall or recognize facts, definitions, laws, etc.--and various kinds of intellectual arts and skills such as ability to analyze, evaluate, synthesize, interpret, etc. In the last few years there have been some direct attacks on these aspects of teaching.

The Logic of Teaching.--Smith and Meux (1959) were the first to give careful consideration to the logical aspects of teaching behavior. A widespread assumption about effective ways of teaching is that understanding of the complexity of this process can be derived from philosophical and psychological theories. According to Smith, those who attempt to develop an understanding of teaching from such an assumption overlook the fact that to apply any theory one must first understand the phenomenon to which it is to be applied. Identification and description of the dimensions of teaching behavior must be made before one can think realistically about concepts and principles relevant to its control. This study was an attempt to accomplish that task. The major purpose was to develop a means of dividing verbal teacher behavior into pedagogical units for analysis. It was analytic and descriptive in nature and concerned the molar aspects of teaching behavior--that is, the logical performances that were verbally executed.

Secondary school class sessions in four subject-matter areas--English, mathematics, science, and social studies--provided the basic data for this study. Five consecutive class sessions in each of seventeen classrooms were recorded and typescripts carefully prepared. The transcripts were then analyzed in terms of two basic units: (1) the episode, defined as a verbal exchange between two or more speakers and (2) the monologue, defined as an individual contribution to classroom procedure. This phase of the research deals only with the classification of the opening phases of episodes.

Logical categories were devised and episodic units were analyzed to ascertain their logical structures based on "epistemic rules." Episodes were classified and attempts were made to determine how verbal discourse conformed to or departed from the model derived from epistemic rules. The episode was analyzed by classification into categories with reference to the _ideal responses_ required by the verbal behavior.

A set of thirteen categories was developed to accomplish this task.

An important assumption is implicit in Smith's work, that is, that the influence of instruction is primarily logical in nature; therefore, the investigators were concerned essentially with the detailed analysis of the logical, cognitive aspects of classroom discourse. They found that such logical operations could be identified, described, and evaluated as to their logical validity and accuracy. A second assumption made was that the observation, analysis, and classification of teaching as it goes on in classrooms will increase the possibility that significant correlational and predictive studies can be made in the future.

A more recent study by Smith and his associates (now in progress) extends the earlier research. In the present effort a new verbal unit, the strategy, forms the basis for analysis. In addition to other units, the venture and the move are used to identify and clarify the concept of teaching strategy.

Strategies are viewed as sets of verbal behaviors employed as a means of achieving a content objective. In other words, strategies involve goals and ways teachers behave in achieving such goals. Such a concept of strategies is appropriate then to the analysis of teacher behavior. Smith defines a strategy as "a set of verbal actions that serves to attain certain results and to guard against others" (1964, p. 50).

Two basic dimensions of strategy were identified. The first, the treatment dimension, concerns the type and sequence of operations that the teacher and the students enter into in setting forth and structuring information in such a way as to disclose the content that is to be learned. The focus here is cognitive in that the presentation of content is the central activity of the teacher. A second dimension, the control dimension, deals with those operations that a teacher uses to guide and control the participation of learners in performing these operations on the content. The emphasis here is on the learner's behavior. The research concentrates only on the treatment dimension.

Smith and his associates have developed a framework and a set of concepts to describe and analyze classroom discourse associated with achieving content objectives. They have developed a means of conceptualizing the verbal maneuvers involved in this aspect of a teacher's behavior. These attempts at analysis of the logical aspects of discourse between teacher and learner represent a monumental undertaking. They must be viewed, however, as beginning steps toward the development of a theory of classroom instruction with logical analysis of behavior as a basis.

Comparing Mathematics Lessons.--A second approach to the identification of behaviors related to learner achievement is reported by Wright and Proctor (1961). The investigators based their work on the assumption that the key aspect of the classroom is the mastery of particular subject matter. Thus, in investigating and categorizing behaviors in the teaching-learning situation, instrumentation should concentrate on the essential aspects of language. This is not dissimilar from the assumptions underlying Smith's work, but Wright and Proctor projected their intention beyond the logical properties of language. They hypothesized that while psychology gives the approach to problems, complete solution is found in logic. The essential aspects of language identifiable within the classroom are carried on through the broad vehicle of psychological processes and in the even broader framework of sociological attitude. Thus, the observation of the classroom must account for content within the framework of these psychological processes and sociological attitudes.

The study reported the observation of twelve classes in a 2 x 2 design using the degree of mathematical rigor and the amount of pupil participation as independent variables. A system for the classification of verbal behaviors in these mathematics classes was devised. The three major categories of behavior were mathematical content, psychological process, and sociological attitude. Each of these categories was broken down into a number of more specific teacher behaviors observed during the data-gathering period of ten days' observation in each of the classroom settings.

The burden of this investigation was further verification of the utility of employing the Wright-Proctor instrument as a device for describing interaction in classroom situations. The results obtained tend to affirm that the instrument can be used in this way. The authors note that ". . . distinctive patterns in the areas of content, process, and attitude were established for the four types of classrooms investigated. . . . These distinctions were noted in terms of single categories within each area, by combinations of categories within content and process and by triple combinations of categories across the three areas simultaneously." (p. 137)

The greatest potential value of this work lies in its extension. A unique aspect of the investigation that needs to be emphasized is the importance of the ultimate "raw encounter" of learner and subject matter.

The instrument is clearly subject matter oriented; philosophers of science might take issue with Wright and Proctor on their use of physical problems in the teaching-learning process and their apparent relegation of psychological processes and attitudes as ancilary to the so-called raw encounter. It is entirely possible, however, that as more is learned about the categories of behavior as developed in this study, as definitions of categories can be simplified, and as theories of instruction are evolved, this study will be hailed as a monumental effort.

The Language of the Classroom --Arno Bellack and his associates (1963) have reported on other investigations into analysis of linguistic behavior Their work was concerned primarily with the various kinds of meanings conveyed through the language that teachers and learners use in the classroom The focus of investigation was on a delineation of the rules of teaching, with descriptions of the respective roles that the teacher and the students play when engaged in the "game of teaching " Two major assumptions are made in this study. The first is that the principal function of language is the communication of meaning Therefore, the analysis of the language of the classroom offers a promising way of studying the communication of meaning Second, the various kinds of verbal activity within the classroom are described as "language games." This provides a basis for treating teaching as a game in the sense that it is rule-governed behavior

Data were collected in seven high school classes studying the problems of American democracy A unit of study in international trade was taught by each of fifteen teachers for a period of four days The sixty class sessions were recorded on tape from which typescripts were prepared. Estimates of verbal intelligence were obtained for all students and pre- and post-tests of knowledge of international trade were administered.

A system for the classification of the distinctive functions of language was developed. This system was based on an examination of the transcripts of classroom discourse and on the view that the meaning of a word is its use in the language.

With language as a central focus of the study, and on the basis of an analysis of the tape recordings and transcripts, Bellack conceived of four basic verbal maneuvers which described what teachers and pupils do pedagogically when engaged in the game of teaching. These maneuvers are called "pedagogical moves" and were described as (1) structuring, (2) soliciting, (3) responding, and (4) reacting moves. Pedagogical moves provided the basic unit of analysis and also served to describe the first of the dimensions of meaning with which Bellack was concerned--the pedagogical meaning.

A second dimension of meaning was the content of what was being said in a classroom. Two basic subdivisions were identified: substantive meanings--the subject matter discussed, and instructional meanings--the routine managerial statements such as those concerned with assignments and procedures. Substantive and the instructional meanings were observed and recorded along with their associated logical meanings.

A third dimension of meaning with which this investigation was concerned was emotional meaning, the "feeling tone" conveyed by the language used. The three dimensions of emotional meaning which were studied were valence, strength, and activity.

The results of this study consist of descriptions of the discourse in classrooms in terms of each of the major categories of meaning and some of the relations among these categories. It is noteworthy that the investigators found much more variability among their teachers in substantive meanings than in teaching techniques used despite the fact that all classes were dealing with the same subject matter carefully delimited. They did not find greater learning about topics most discussed. From this finding it is concluded that instead of setting up certain kinds of knowledge that should be learned, it might be more useful to focus future research in terms of the question, "What kinds of classroom events are related to what kinds of learning outcomes?" A variety of techniques for data collection must be developed before an answer to this question might be given. A follow-up, more detailed study of pedagogical moves, definition of their functions, patterns of interchange, and kinds of responding behaviors that result, has been undertaken by the investigators.

Taba and her associates (1964) were also concerned with cognitive processes, but their approach was somewhat different from any of the studies previously reported. They were interested in assessing the role of curriculum organization and teacher education in the development of thinking processes in students. A curriculum was developed and a program of teacher education devised with the explicit purpose of achieving a high level of thinking in elementary school children. Taba developed a concept of thinking and devised instruments by which certain cognitive processes could be measured, analyzed, and observed. After extensive study of related research and literature, three clusters of cognitive processes were identified: (1) grouping and classification of information, (2) interpretation of data and the making of inferences, and (3) application of principles and facts in explaining new phenomena, to predict consequences from known conditions, or to develop hypotheses through the use of known generalizations and facts. These three cognitive processes were analyzed in terms of their basic elements and according to the ways one masters such processes.

The three cognitive tasks were seen as having certain commonality. First, all involved a series of steps; second, these steps were viewed as a kind of hierarchy of abstraction and complexity; third, each of the operations involved different levels of intuitive and conscious awareness of the principles which govern the operations.

This conceptualization of cognitive tasks provided the framework for the training of the teachers involved in the study. During the training process special attention was given to the development of cognitive skills in elementary school social studies classes.

Two instruments were developed for the purpose of measuring and analyzing cognitive skills. The first, a Social Studies Inference Test, was designed to test a student's ability to draw inferences from new data. The second instrument was a coding system designed to analyze recordings of a class session. Through the use of this coding system, one was provided a means for tracing the patterns of development of cognitive skills as such development occurred in a classroom. This system enabled one to map teaching strategies and to determine how the teachers sought to extend a given level of thought to another higher level of thought.

The results of the study are given in terms of changes in the measures of cognitive skill and provide descriptions of the teaching strategies employed to bring about such change. A most important finding of this work was that the most marked single influence on cognitive performances in children resided in the impact of teaching strategies employed by the teacher. The whole pattern of teacher behaviors determined the level of response attained in learners.

The investigators identified several avenues for further study of cognitive development: (1) a much more thorough study of teaching strategies is needed; (2) careful examination must be made of how teachers' questions and statements function in such development; (3) identification is necessary of the particular behaviors or sequences and combinations of behaviors that lead to the acquisition of different types of conceptual structures.

The study pointed up the need for a four-dimensional analysis of classroom interaction which includes: (1) pedagogical functions of teacher behavior, (2) logical hierarchy of thought processes, (3) validity of significance of the content of these processes, and (4) the impact of each on the others.

Teaching Behavior and Pupil Thinking.--A study by Miller (1964) is unique in the literature of teacher behavior in that the study was devised to test a partial theory of instruction focusing upon classroom teaching behavior employing certain aspects of social psychology and educational pedagogy. This effort proposed to make somewhat explicit an emerging theory of instruction and to make a preliminary test of some aspects of that theory. The theory divided teaching behaviors into two basic divisions and seven teaching functions. The divisions were (1) working on content or task, and (2) maintaining social order. Seven teaching functions within the major divisions were studied. Included in content or task were (a) providing focus, (b) developing the object of focus, (c) giving information directly, and (d) appraising pupil efforts.

Responsibilities which maintain the social order were (e) setting expectations for pupil behavior, (f) implementing action which regulates pupil behavior, and (g) assessing pupil effort along this dimension.

According to the theory, a teacher discharges the two basic responsibilities and performs the seven teaching functions by playing a wide variety of roles. A system of classification--The Responsive-Directive Scale--grew out of the guiding theory of instruction.

The study attempted to determine if highly directive teaching was accompanied by pupil behavior less educative than when teaching behaviors were discharged through roles more responsive to learner cues. The two major divisions of teaching functions served as predicators, and the research related teacher behavior to pupil performance. The study made use of levels of pupil mental activity as one of the critarion measures. Related problems included an investigation of the relationships between the two classes of teaching behaviors and (1) growth of pupils' achievement in content, and (2) the development of pupil attitudes toward the learning experience and the subject matter studied.

Teaching behavior was measured by coding all other remarks made by teachers with respect to content while instructing seventh- and eighth-grade students during eighty staged lessons in American Economics. The teaching was recorded on audio tape and transcribed to provide typescripts. The typescripts of behavior were coded and scored according to the Responsive-Directive Scale.

The conclusions of this study have great significance for further investigation. When content was studied, responsive teaching was more effective than directive teaching. Pupils discussing content under teaching behavior which was characterized by responsiveness to learner cues, evidenced more complex, or higher levels of mental activity than did pupils under teaching which ignored these cues. Pupils under responsive teaching expressed more positive attitudes toward the experience and achieved as much on objective-type tests when compared with pupils who were instructed under directive teaching. The investigator stated that while these conclusions cannot be generalized to all pupils and all teachers on the basis of this one study, it is likely that the findings are generally applicable.

The section of the Responsive-Directive Scale dealing with content was a useful instrument for measuring classroom behavior. The scale permitted a detailed description of classroom teaching behavior and placed the description within a framework which permitted theoretical interpretation.

The findings of this endeavor confirmed parts of the theory that had been evolved. The theory failed to predict achievement, either in mastery of facts or in higher understanding on the part of pupils, but it did predict results in levels of pupil understanding in discussion. In contrast to the findings of other investigators, the directive-responsive dimension had no real effect upon mastery of facts or deeper meaning, as measured by achievement tests. In addition, pupil-exhibited understanding of a subject during discussion was not related to measured achievement in that subject matter.

Analysis of research of the type reported in the preceding discussions leads to the conclusion that workable systems for recording selected aspects of teacher behavior have been in existence for several years. Specific approaches and techniques for the measurement of classroom behavior continue to be developed and refined. Psychological climate is the dimension that has been most thoroughly analyzed and successfully measured, and in the last few years those dimensions related to the content of instruction and patterns of ideas in teaching and learning have been given emphasis. The behaviors teachers employ as they teach are beginning to become quantifiable through the use of relatively objective instruments. Researchers have focused attention on both verbal and non-verbal behaviors of teachers and, to a limited degree, on the behaviors of learners. Special attention has been given to the roles, functions, and activities in which teachers engage. It is recognized that much remains to be done before correlations among teacher and learner behaviors can be established, but a more comprehensive system for the description and analysis of the range of behaviors employed by teachers while teaching is now a possibility because of the work of investigators such as those reported here.

CHAPTER III

PRESENTATION OF PARADIGMS AND INSTRUMENT

Previous efforts at development of systems of classification for teacher classroom behavior have been designed to yield data about specific hypotheses developed from a particular philosophical or psychological orientation or were directed to the analysis of specific behaviors. Each has provided paradigms and theories, explicit or implicit, through which teaching might be viewed. Illustrations of such conceptions of teaching are discussed below. They were selected from among more than a score of recently evolved theories and models.

Teaching as Interaction

The studies of teacher behavior conducted by Smith (1959), Hughes (1959), and Bellack (1963) each set forth a theory of teaching as a process of interaction. This common concept was shared by them, but the components of interaction as defined by each investigator differed markedly.

Smith's pedagogical model includes the following elements:

I Independent Variables (Teacher)	II Intervening Variables (Pupils)	III Dependent Variables (Pupils)
(1) Linguistic behavior (2) Performative behavior (3) Expressive behavior	These consist of entities and processes such as memories, beliefs, needs inverences, and associative mechanisms	(1) Linguistic behavior (2) Performative behavior (3) Expressive behavior

Smith viewed teaching as the action of an agent in a situation toward an end-in-view.

$$T = A_a / Sit \longleftrightarrow E.I.V.$$

The situation is comprised of material means plus procedural means plus unknown, uncontrollable variables.

$$S = M_m + M_p + X$$

The means consists of two types of factors: subject matter and instructional paraphernalia, and, the ways the agent (teacher) uses those factors. Smith's study investigated only procedural means, consisting of large maneuvers called strategies and smaller movements called logical operations.

$$M_p = St + L.O.$$

Employing procedural means, the meaning of discourse directed from the agent (teacher) to the pupils is governed by rules of logic in terms of ideal responses.

$$M_p = D_m \longleftrightarrow \frac{t_t + p}{Res_{Id}}$$

Teaching then becomes the interaction of a teacher's perception of pupil's behavior; teacher's diagnosis of pupil's state; teacher's actions; pupil's reaction to teacher's action.

$$T = (p_t + d_t + a_t) \longleftrightarrow (d_p + r_p)$$

Hughes' theory of teaching includes a mutual or reciprocal action or influence between learner and teacher; teaching is interaction toward a goal.

$$T = I \longrightarrow G$$

Interaction is composed of teacher perception plus teacher responsiveness in relation to teacher and student, student and student, and/or teacher and group.

$$I = t_p + t_r \longleftrightarrow (s_t + s_s + t_n)$$

Teaching then becomes the interaction of a teacher's perceptions plus the teacher's responsiveness in relation to teacher and student, student and student, and/or teacher and group toward a goal.

$$T = t_p + t_r \Longleftrightarrow (s_t + s_s + t_n) \longrightarrow G$$

Bellack viewed teaching as interaction with subject matter toward learning as the end-in-view. Interaction is rule controlled linguistic discourse, a reciprocal affair between teacher and pupils. Rules dictate the various roles performed by teacher and pupils and are identifiable in terms of the meaning of the verbal expressions. Teaching behavior is composed of three interrelated and coexistent dimensions - purpose, content and feeling.

Teaching, then, is equal to the function of discourse between teacher and pupil plus the meaning of discourse between teacher and pupil plus the emotional meaning (feeling) between teacher and pupil directed to the learning of subject matter as the end-in-view.

$$T = D_F\ (t + p) + D_M\ (t + p) + E_M\ (t + p) \longrightarrow L_{sm}$$

The function of discourse is equal to structuring, soliciting, responding, or reaction behaviors controlled by rules of intent.

$$D_F = \frac{S\ (a,\ 1),\ I\ (a,\ 1)}{R_{lan}}$$

Emotional meaning is equal to valance plus activity plus potency plus stability plus some unknown variables (x).

$$E_M = v + ac + po + sb + x$$

Models from Related Fields

A number of models, paradigms, and theoretical constructs which have been employed in related fields were also examined for their relevance to teacher behavior. From among these studies, two are presented as illustrative of significant conceptualizations that were used by this project in evolving a view of teaching.

Bales' (1950) work in small group and leadership analysis culminated in the development of a technique that permits an observer to categorize the roles played by the members of small problem-solving groups. His categories, similar in nature to those constructed in studies of teacher behavior, are presented in Figure 1. The conceptual similarity of his system to parts of those of Hughes and Miller, for example, is immediately apparent.

A "Paradigm for Research on Administrator Behavior" developed by Halpin (1957) was most helpful in thinking about the problem of teacher behavior since it was designed for research on human behavior in an institutional setting. Figure 2 presents this paradigm in adapted form. It should be emphasized that the paradigm is used to account for and schematize the variables associated with the dynamics of the classroom, not to describe or explain these dynamics. As such, it is neither a theory nor a classification system.

An Explanation of the Paradigm (Clark, 1963)*

The paradigm is composed of four panels:

Panel 1. The teaching task is defined in terms of desirable or sought-after student behaviors and behavioral products. The task, as a whole, represents the idealized mission of instruction. It can, of course, be divided into a series of sub-tasks designed to effect specific changes in student behavior.

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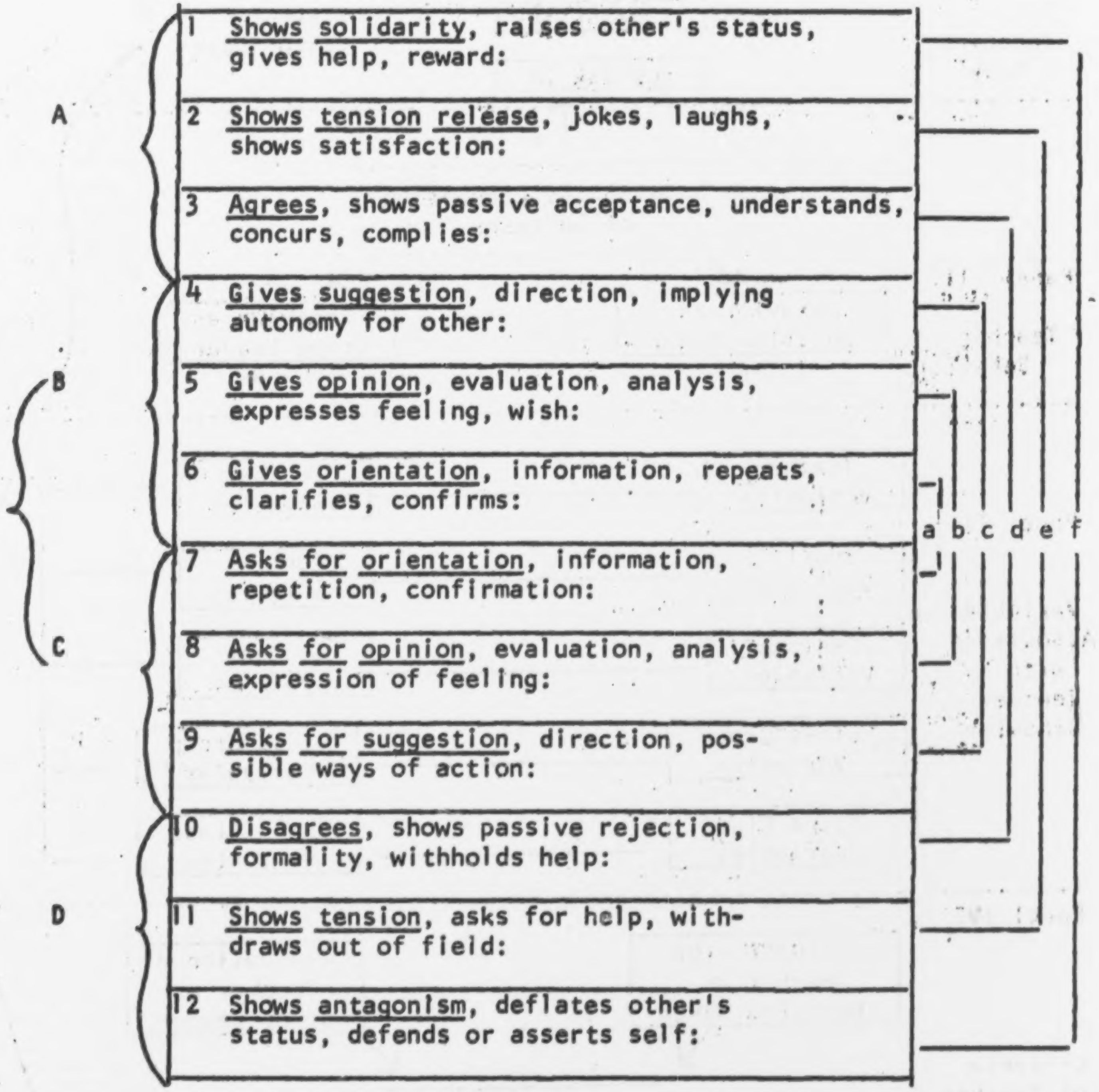
*The basic definition of terms and the explanation of the paradigm's panels and variables rely heavily on the work by Halpin (1957).

Figure 1

Bale's Interaction Process Analysis



1 Shows solidarity, raises other's status, gives help, reward:

2 Shows tension release, jokes, laughs, shows satisfaction:

3 Agrees, shows passive acceptance, understands, concurs, complies:

4 Gives suggestion, direction, implying autonomy for other:

5 Gives opinion, evaluation, analysis, expresses feeling, wish:

6 Gives orientation, information, repeats, clarifies, confirms:

7 Asks for orientation, information, repetition, confirmation:

8 Asks for opinion, evaluation, analysis, expression of feeling:

9 Asks for suggestion, direction, possible ways of action:

10 Disagrees, shows passive rejection, formality, withholds help:

11 Shows tension, asks for help, withdraws out of field:

12 Shows antagonism, deflates other's status, defends or asserts self:

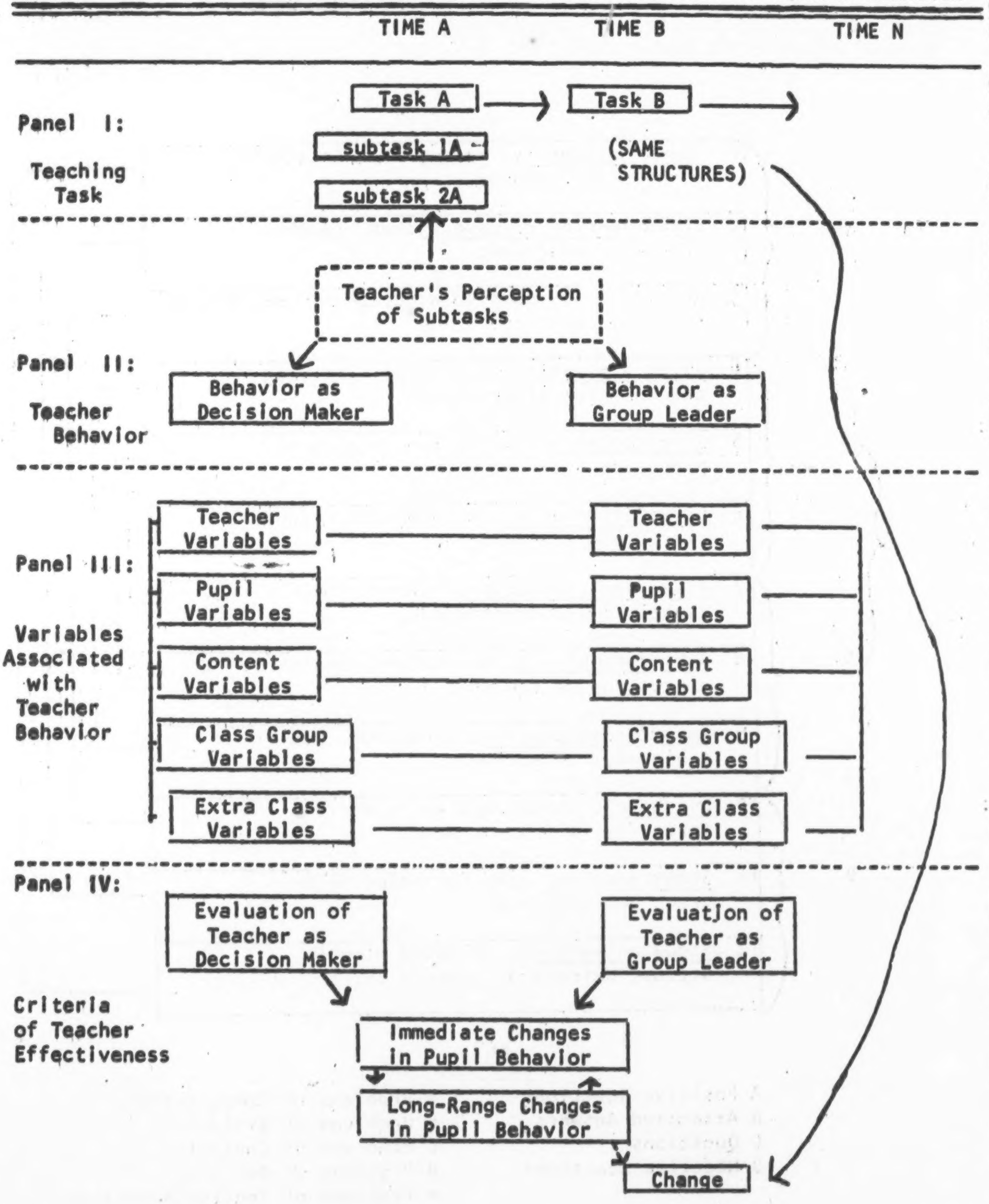
KEY:

A Positive Reactions
B Attempted Answers
C Questions
D Negative Reactions

a Problems of Communication
b Problems of Evaluation
c Problems of Control
d Problems of Decision
e Problems of Tension Reduction
f Problems of Reintegration

Figure 2

*AN ADAPTATION OF THE HALPIN RESEARCH PARADIGM TO THE STUDY OF TEACHER BEHAVIOR


TIME A
TIME B
TIME N
Panel I:
Teaching Task
Task A
Task B
subtask 1A
subtask 2A
(SAME STRUCTURES)
Teacher's Perception of Subtasks
Panel II:
Teacher Behavior
Behavior as Decision Maker
Behavior as Group Leader
Panel III:
Variables Associated with Teacher Behavior
Teacher Variables
Pupil Variables
Content Variables
Class Group Variables
Extra Class Variables
Teacher Variables
Pupil Variables
Content Variables
Class Group Variables
Extra Class Variables
Panel IV:
Criteria of Teacher Effectiveness
Evaluation of Teacher as Decision Maker
Evaluation of Teacher as Group Leader
Immediate Changes in Pupil Behavior
Long-Range Changes in Pupil Behavior
Change

Panel II. This panel encompasses the behavior of the teacher as he fills his role in accomplishing "the teaching task" as he perceives it which, of course, may or may not be congruent with the task as defined in Panel I. The teacher's behavior is distinguished in terms of behavior as a decision maker and behavior as a group leader. Decision making behavior relates to his selection of a course of action from alternative courses of action while group leader behavior is that observable interaction which the teacher has with the class group or individuals within the class group. Obviously the teacher may engage in decision making while performing as a group leader but the distinction between the activities seems sufficiently useful to retain since decision-making behavior is very difficult to reduce to operational terms and group-leader behavior can usually be observed.

Panel III. The factors included in Panel III are variables which define the conditions under which significant relationships may be expected to obtain between the behaviors in Panel II and the criterion measures in Panel IV. These variables are assumed to affect the behavior of the teacher. They can be subclassified as (1) teacher variables, (2) pupil variables, (3) content variables, (4) class group variables, and (5) extra-class variables. The teacher variables refer to the attributes and characteristics of the teacher as an individual, e.g., age, intelligence, personality, etc. The pupil variables refer, of course, to comparable attributes and characteriscits of the pupils as persons. Content variables refer to the logic, nature, and structure of what is being taught. The class group variables encompass the factors which make a collection of individuals a group, e.g., morale, group cohesiveness, class size, and the like. The extra-class variables are those outside of the content of and participants in the teaching-learning process which, nonetheless, affect the process, e.g., community pressures and mores, administrators' actions, facilities and teaching materials, and the like.

Panel IV. Included here are the measures of the extent to which the teaching task has been accomplished effectively. These criteria can be expressed at a number of levels--first, in the form of ratings or evaluations of teacher effectiveness; second, in terms of immediate behavioral change on the part of the learner; and finally, as the long-range changes in the behavior of the learner. These criteria vary in the order stated above as adequate measures of teacher behavior. For convenience, ratings are labeled intermediate criteria and changes in pupil behavior, either immediate or long-range, are ultimate criteria.

The ultimate criteria of teacher effectiveness should be expressed in terms of pupil achievement, in respect to the changes in the pupil accomplishments that can be attributed to the behavior of the teacher. The final assessment of teacher effectiveness in the model is illustrated as the difference between the students' achievement at Times A and B in respect to whatever products are specified. This achievement (change) should be measured in respect to the same behaviors and behavioral products that have been used to define the task; but whereas the task is defined in terms of ideal outcomes, achievement should be described in the language of "what is."

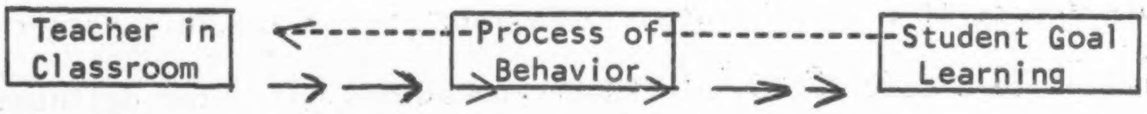
Teaching as Viewed in this Study

It is inevitable that the conceptions of teaching as defined in this study should find their sources in investigations preceding it. Indeed, the purpose of the project, as originally conceived, was to use concepts employed by others, to build upon their specific findings, and to synthesize their instrumentation and methodology.

One significant departure must be made explicit, that is, in this study great effort was made to keep conceptions about the nature of teaching and the system of categories for viewing teaching as value-free as possible. No specific hypotheses or effectiveness constructs were used. The purpose was to develop a system of categories which would permit the classification, i.e., the description, of all observable teacher classroom behaviors--good or bad, logical or illogical, directive or integrative.

At its most global level, teaching is viewed as a process of interaction.

Figure 3. Teaching as Interaction



The broken arrow indicates a feedback control which is only incidentally investigated in this effort but which most investigators agree plays an important part in an understanding of the totality called teaching,

After a review of most of the research completed in teacher behavior and related fields, preliminary observation of live classrooms was undertaken. Borrowing upon the ideas of others, certain descriptive categories of teacher behavior were evolved and tested through further observation. After a period of several weeks, employing this process over and over again, it was concluded that a comprehensive view of teacher behavior includes four major dimensions: (1) a source dimension; (2) a direction dimension, (3) a function dimension, and (4) a sign dimension. Each of these dimensions of teaching is observable and quantifiable, the analysis of which provides empirical data about what a teacher does; how he behaves while teaching. That is to say, one cannot classify a teacher behavior as response or originate without taking into consideration the total interaction of the situation which includes student behaviors. If a teacher behavior is coded, "Originate," the observer must be aware of the absence of any student behavior to which the noted behavior could be a response. "Respond" behavior on the other hand is so classified because a student behavior, often a direct question, is noted as the basis of the teacher behavior which follows it.

Teaching is governed by the expectation that learning will result from teaching acts. A complete picture of teaching is possible only when a description of the student's behavior is included as a possible source of a given teacher behavior. But since this research was limited to a description of teacher behaviors only, the delineation of learner behavior within the classroom interaction was not undertaken. The Source Dimension of teaching provides an indication of the relationship of student and teacher interaction at a basic level. Teacher reception of student behavior is not classifiable without recognition of the student behavior itself.

Teaching implies interaction among persons within a superior-subordinate relationship. Usually the presence of a teacher and a student or students is required, although it is recognized that books and other instructional media may also "teach." Teaching is the interaction between a projector entity called "teacher" and receptor entities within a classroom situation. The receptor entities include students as individuals, in small groups, and as a whole class as well as inanimate objects with which the teacher interacts. While it is recognized that the behaving entities and the receiving entities, through the process of interaction, are interdependent and may even interchange roles, the teacher as teacher behaves in a manner distinct from the behavior of the teacher as learner or receiver of instruction.

The teacher (the recognized employee) may delegate his responsibility and role in the classroom to a student or students. At such times the teacher may remove himself from the interaction or take the role of a student. The student or students' behaviors then become teacher behaviors.

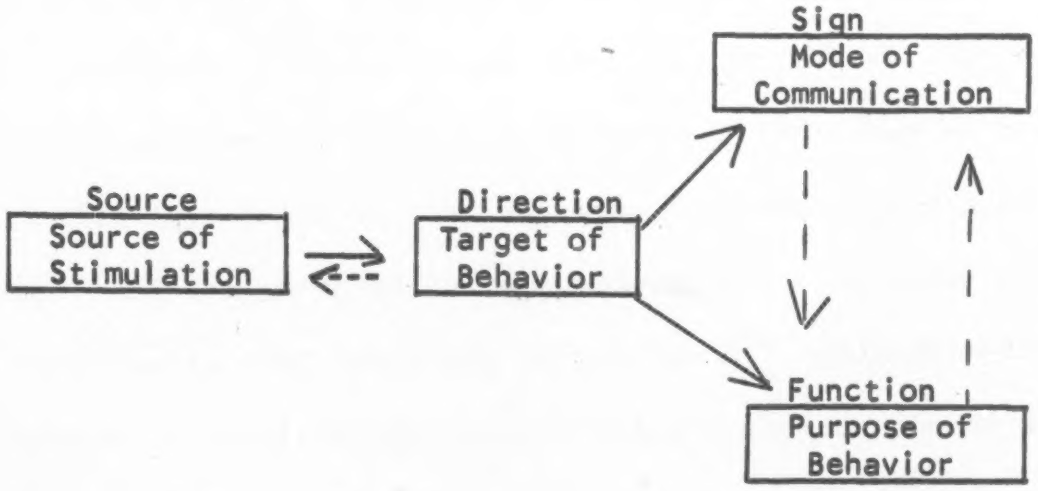
The identification and classification of the nature of the receptor entities provides the Direction Dimension of teaching in this study.

The broad aim of classifying all observable teacher classroom behavior has been restricted in this study by the general delimitation of behaviors which are purposeful in nature. This limitation excludes from consideration behaviors of a personal nature not directly related to the role of the teacher as teacher in a classroom. Therefore, random tapping on the desk, twisting a pencil, clearing the throat, combing hair, adjusting clothing, etc., are not classified. The assumption is made that the teacher's purpose in the classroom is to teach something. Behaviors categorized are those that fulfill a teaching function. The purpose a given behavior serves in teaching determines function. A variety of goals has been established for the schools in our society. While a given set of goals or objectives may contain more or fewer statements than another, the teacher's role in meeting them may be conceptualized as involving three essential tasks. One task the teacher must attempt to achieve is related to subject matter or content. Content may be comprised of facts, names, concepts, etc., that deal with fields of organized knowledge per se, but it might also deal with beliefs, attitudes, ways of organizing, skills, and processes of instruction. A second major responsibility of teaching is that of establishing and maintaining interpersonal relations among persons within the classroom so that the content task may be realized. The third is the task of facilitation of the learning processes. Behaviors engaged in by the teacher to accomplish these three tasks constitute the Function Dimension of teaching.

In order for a behavior to be observed it must be communicated in some way. Communication takes several avenues and a given function may require more than one mode of expression. Teachers may elect to use more than one mode of expression in fulfilling a given function. The mode of behavior observed makes up the Sign Dimension of teaching.

Figure 4 illustrates the relationship among the four dimensions of teaching.

Figure 4. Dimensions of Teacher Classroom Behavior

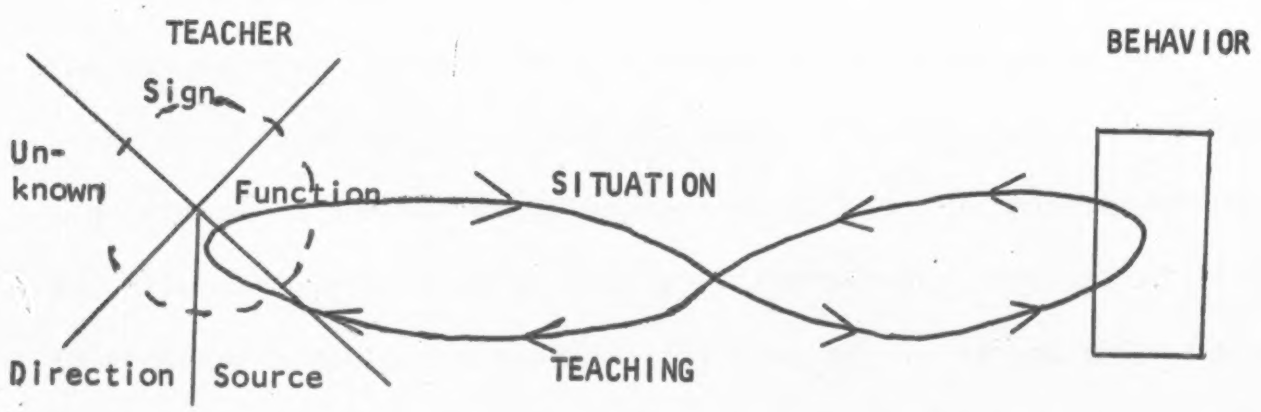


The source of the behavior controls the other dimensions of teacher behavior, but it may be determined through the observer's recognition of the target of focus, the Direction Dimension. The direction, in turn, takes precedence in determining the mode and purpose of the teacher's behavior. The mode of communication together with the purpose of behavior give meaning to all behavior. Some modes limit the range of possibility of purpose while other purposes may limit the modes of behavior available to the teacher. The solid arrows denote controlling relationships. Broken arrows indicate influential relationships not sequentially determined.

This paradigm gives a false impression if it is perceived in a static form. A generalized model developed by Mooney (1964) presents a dynamic pattern for characterizing the complicated process of teacher behavior. It not only permits the depiction of the system developed in this study but also provides for expansion as further developments in research technology and discovery permit.

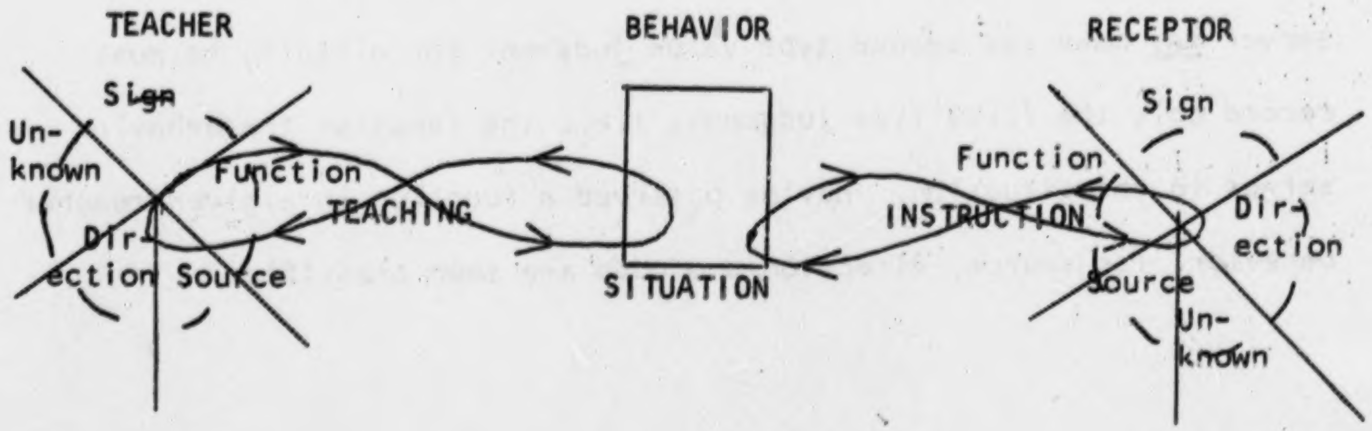
The stimulation which causes a given teacher behavior may be either explicit or implicit. When the source is explicit to an observer the teacher is said to be responding to someone or something. When it is implicit, the behavior is said to have originated with the teacher. The source of the behavior controls the other dimensions of teacher behavior. (The solid arrows denote controlling relationships.) However, in the case of teacher response behaviors they are so categorized on the basis of the observer's recognition of the target (i.e., student, teaching aid, visitor, etc.) upon which the teacher is focusing. The target may be either narrowly or broadly defined. The broader scope is assumed unless the narrower focus is made explicit in the teacher's behavior. The focus of the teacher on a target is the basis for determining the Direction Dimension. The direction, in turn, takes precedence in determining the mode and purpose of the teacher's behavior. The purpose of behavior indicates the meaning it has for the receptor. The mode of communication, called the Sign Dimension, is selected on the basis of the identified target and with the hope of transmitting a teaching function. Some signs may limit the range of possibility of purpose, i.e., neither a gesture nor silence would usually be a means of explanation. Likewise, supportive behavior is seldom performed by reading or writing in the normal classroom. The sign and function are not sequentially determinable but they do affect each other; therefore, broken arrows are used to indicate the mutual influence. The double direction indicates the lack of established sequence in determining these dimensions.

Figure 5. Paradigm of Self-Perceived Teacher Behavior



The broken circle represents the teacher as an entity. The breaks in the circle indicate the openness of the teacher in accommodating the influence of forces outside the teacher. The wedge-shaped portions which intrude into the teacher's entity arise from the total situation in which the behavior occurs. The relevance of a given behavior is ascertained by the import of that behavior within the situation. The infinity sign suggests the continuous nature of teacher behaviors as the teacher interacts with his environment in the classroom situation. The rectangle represents a point in time at which the teacher behavior may be arrested for purposes of observation, in this case, self-perception. The teacher sees himself as teacher and, thus, feeds on his own judgment of the degree to which he has fulfilled the purposes or functions established for that particular act (behavior, encounter). "Selective fittings" must take place in each of the major dimensions. There is no significance to the proportion of space occupied by the separate wedges. The influence of each will vary from teacher to teacher and situation to situation. Increased refinement of research instruments and technology, as well as application of techniques other than observation, will provide additional breakdowns within the area labeled "unknown" in this paradigm. The four named dimensions (source, direction, function, sign) included in the wedge-shaped divisions are sufficient for the observable aspects of teacher behavior, but they do not include teacher personality variables, teacher training variables, teacher planning variables, etc., which are not open to observation. These unknown variables play an as yet undefined role in the teacher behavior process as developed.

Figure 6. Paradigm of Observer Perception of Teacher Behavior



As the teacher continues to interact in the situation he makes the "selective fittings" in the four major dimensions of teaching identified above. The receptors, a student or students, make comparable, but not necessarily identical, fittings as they perceive the behavior. Non-student receptors, the researchers in this instance, fill a "student-like" role but because of the "unknowns" impinging upon the receptor entity, that role cannot be said to be identical. Likewise, the perceptions of the students are not identical. However, a large measure of a teacher's time is devoted to the task of achieving goals by possibly disparate means for different students. The researcher as receptor sees the same behavior that the student as receptor sees, but his special role in the situation is to make classifications of what he sees rather than to learn or to achieve some goal, as in the case of student receptors. This process is illustrated in Figure 6. The research observer receptor then "arrests" behaviors for the purpose of classifying the exhibited dimensions of teaching. He is involved in the process of interaction on restricted terms. The record he makes is influenced by unknowns impinging upon him just as there are unknowns influencing the teacher and the receptors. The process of categorizing is similar in nature to receiving instruction by the student--self-evaluation from feedback by the teacher. Judgments are made as to the function the behavior serves and its admittance or rejection is determined on this basis. While the observer may make the second type value judgment for himself, he must record only the first type judgment, i.e., the function the behavior serves in the situation. Having observed a function in a given teacher behavior, its source, direction and mode are then classified.

Outline of the Instrument for Categorization of Teacher Classroom Behavior

The primary effort of this study was directed toward developing a system of categories into which observable teacher behaviors could be classified. The specimen record or basic component of teacher behavior classified in this study is referred to as an encounter.

An encounter is a unit of teacher behavior that serves a discernible function within a teaching situation. The four dimensions of teacher behavior change in sequence (pattern and order) during the teacher performance. Each change in dimension indicates a new encounter. For classification purposes, the critical dimension is the Function Dimension of teaching. Each encounter must have a function. Behaviors without a discernible teaching purpose are not classified.

An encounter begins when a function is observed. It ends when that behavior has no function or when a shift to another teaching dimension is observed. For example, the teacher may begin by explaining something orally. He may continue to explain by writing and reading in sequence while supporting this "explaining" behavior with gestures and/or performance of some nature. A change in the Source Dimension indicates an interruption which is automatically accompanied by a change in the Function Dimension and, thus, one encounter ends and another begins. Likewise, a shift in the Direction Dimension denotes a new encounter if a new function is observed. The turm "encounter" was chosen to emphasize the concept that a teacher's behavior has meaning to the degree that such behavior is perceived and acted upon by another person. In the classroom setting this person is typically the student.

A given encounter is categorized in each of the four dimensions. As indicated above, each encounter may have shifts within the *Sign Dimensions*. Furthermore, a given behavior may be classified in more than one category of the *Function Dimension*. Any change in the *Source* and *Direction Dimensions* indicates a new encounter.

The instrument is presented in brief form below.

I. Source Dimension - Indicates the origin of an encounter
  A. Originate - The source of the behavior is undiscernible within the classroom setting.
  B. Respond - The source of the behavior is some discernible aspect of the classroom setting.

II. Direction Dimension - Indicates the target to which the behavior is directed.
  A. Individual - Behavior focused on one person.
  B. Group - Behavior focused on more than one person but less than the total class.
  C. Class - Behavior focused on the whole class.
  D. Object - Behavior focused on inanimate element in physical environment.

III. Sign Dimension - Indicates the mode of communication of an encounter.
  A. Speak - Behavior characterized by spontaneous speech.
  B. Read - Behavior characterized by oral reading of (printed) written matter.
  C. Gesture - Behavior characterized by purposive body movement.
  D. Perform - Behavior characterized by demonstration, non-verbal illustration, singing, etc.
  E. Write - Behavior characterized by chalkboard presentation, writing on a chart, or overhead projector foil, etc., but excluding drawing.

F. Silence - Behavior characterized by an absence of other signs.

G. Laugh - Behavior characterized by inarticulate sound of mirth or derision.

IV. Function Dimension - Indicates the purpose of the behavior within an encounter.

A. Structure - Set the context and focus of subsequent subject matter and/or process.

1. Initiate - Introduce and launch an activity, task, or area for study.

2. Order - Arrange elements of subject matter and/or process in a systematic manner.

3. Assign - Designate required activity.

B. Develop - Elaborate and extend within an established structure.

1. Inform - State facts, ideas, concepts, etc.

2. Explain - Show relationship between ideas, objects, principles, etc.

3. Check - Request information concerning understanding.

4. Elicit - Solicit a verbal response that states facts, ideas, concepts, etc.

5. Test - Conduct a written quiz or examination--dictate questions, supply answers, without explanation.

6. Reinforce - Confirm or sustain an idea, approach, or method through reiteration.

7. Summarize - Restate principal points in brief form.

8. Stimulate - Foster student involvement and participation.

C. Administer - Execute tasks of classroom routine and procedure.

1. Manipulate - Arrange elements of the classroom environment, personal and physical. (Cause others to do something.)

2. Manage Materiel - Provide or coordinate use of media, supplies, or materials.

   3. Routine - Request information regarding compliance with individual, class or school expectations (regulations).

   4. Proctor - Monitor classroom during group activity, testing, student teacher performance, etc,

D. Regulate - Establish and maintain interpersonal relations.

   1. Set Standard - Impose or guide development of standards of behavior.

   2. Support - Express confidence, commendation, or empathy.

   3. Restrict - Reprimand, threaten, punish, etc.

   4. Assist - Provide personal help; does for.

   5. Inquire - Ascertain student involvement.

   6. Monitor-Self - Recognize and interpret teacher's behavior. (Check own understanding.)

E. Evaluate - Ascertain the relevance or correctness of subject matter and/or process.

   1. Appraise - Verify by appeal to external evidence or authority.

   2. Opine - Judge on the basis of personal values and beliefs.

   3. Stereotype - React without stated reference to criteria or person.

CHAPTER IV

RESEARCH METHOD

The central objective of this study was to develop a taxonomy for the classification of teacher classroom behavior. To accomplish this aim three specific tasks were envisaged:

(1) To describe and synthesize the efforts which have been made in the field of education in analyzing teacher classroom behavior.

(2) To develop a taxonomy of teacher classroom behaviors which accounts for the observable dimensions of interaction in the classroom.

(3) To test empirically the sufficiency of the taxonomy.

These tasks were handled in three major phases. Phase I, the analysis phase, included a review of the literature of teacher education and related behavioral sciences. Phase II, the synthesis and specification phase, attempted to integrate the classification systems developed by other studies into one system. Operational paradigms were developed. In Phase III, the adequacy phase, the taxonomy was empirically tested and modified as strengths and inadequacies became apparent.

The procedures for implementation of these phases are explained in detail.

Phase I - Analysis

This portion of the investigation was directed specifically toward objective 1. The research staff made a thorough search of the literature of teacher education, identifying, studying, and abstracting efforts such as those enumerated in the review of related research (see Chapter II) which have attempted to analyze and conceptualize various aspects of teacher classroom behavior. A similar search of parallel studies in other social process fields was conducted in an effort to gain insights which showed promise for illuminating or classifying teacher behavior. The purpose of the search was to identify data implicitly and explicitly related to teacher classroom behavior and to combine these data into systems of classification.

A working paper was prepared on each of the studies. These papers were presented and discussed by the project staff during study sessions. This was followed by an opportunity to discuss aspects of the tentative findings with scholarly specialists in the field of teacher education. These contracts and consultations were made in conjunction with Cooperative Research Project F-015, An Analysis and Projection of Research in Teacher Education.

The analysis of the research included comparisons of specific results, areas of concern of the studies, assumptions, hypotheses and variables identified in each study.

On the basis of the survey and analysis of related investigations, a series of working models were projected in an effort to identify the essential elements of teacher behavior. These models, in turn, provided a basis for the activities of Phase II.

Phase II - Synthesis and Specification

Phase II involved the integration, synthesis, and translation of the relevant portions of the work of other investigators into a taxonomy and several paradigms. This was accomplished by the project staff through: (1) extending the developed systems of classification to cover possible gaps and (2) integrating, i.e., logically relating the categories of one system to another by subsuming the specific under the more general. Initial categories were checked through live classroom observations during which examples of specific behaviors were recorded and analyzed. Further observations provided evidence of behaviors which were difficult or impossible to categorize under the rubrics developed to that point on the basis of the synthetic approach. Frequent references were made to the examples and results of such studies as those conducted by Flanders, Smith, Bellack, and Hughes. The results of this effort were then distributed to selected original investigators recruited earlier. Their reactions and suggestions were considered by the project staff and operational definitions of categories were developed for the third phase.

Phase III - Assessment and Modification

Phase III was designed to empirically test and subsequently modify the paradigms and antecedent taxonomy developed for this study. It was divided into four major activities: (1) the conducting of a pilot study at the University of Arizona, (2) the modification of the initial categories and operational definitions, (3) the conducting of the major sufficiency study, and (4) the analysis of the results of the data collected in the sufficiency study.

Initial Field Study.--The Initial Field Study necessitated (1) training the observers, (2) selection of participating schools, (3) establishing observation procedures and techniques, and (4) evaluating the data for reliability of classification.

Following the initial development of the instrument for classification, members of the project staff held a series of meetings with a field study team at the University of Arizona. At that time, the field study team became familiar with the purposes of the project, the initial classification instrument and operational categories, and the procedures to be followed in the pilot study. The field team in turn, undertook a training program in preparation for the pilot observations and the initial try-out of the system of classification.

Subjects.--Under the leadership of the field study team at the University of Arizona, twenty-nine classes were selected in seven different school settings in and around Tucson. A range of subject matter teaching and grade level of classrooms was sought. Arrangements for selection of the schools were made through the Assistant Superintendent of Elementary Education and the Administrative Assistant to the Superintendent for Tucson School District #1. A representative cross-section of the community in general was sought in school identification.

In the final group of classes selected, the student populations represented a range from "lower-lower middle" class to "middle" and "upper-middle" class population at the elementary and junior high school levels, one high school accepting students from all socioeconomic classes, and a four-year university of approximately 18,000 students. In the latter instance, five observations were in undergraduate classes, one in a graduate class and one in a combined graduate and undergraduate class in the College of Education.

The principals of each of the public schools were contacted and willingly gave their support to the project. In each case the principal made arrangements for the observations with those teachers who were interested in participating in the project. Observations were conducted at all grade levels except kindergarten and third grade. Table 1 shows a breakdown by grade and subject matter of observations conducted in the pilot study.

Procedures.--A team of two observers conducted the live classroom observations using the instructions and instruments prepared by the research staff. Each observer categorized the same teacher behavior in a given classroom independently and made notes of behaviors which could not be classified. The primary aim was to check the sufficiency of the categories that had been developed in the initial phases of the project. A subsidiary aim was to determine the relative utility of differing recording instruments and techniques.

Two different forms (A and B) for recording observations were used. (See Appendix C) It was proposed that each form be used in observations conducted at 5-, 10-, and 15-second intervals as well as with an untimed observation. (The initial instrument and coding instructions are included in Appendices A and B.) However the observers discovered during the training period that the 5-second interval was unrealistic because of the complexity of the system of categories used for classification. It was necessary to cognitively categorize, then transpose that categorization onto the checksheet

Table 1

Grade Level and Subject Matter Distributions of Field Study Observations

Grade Level	Number of Observations	Subject Matter Observed
1	3	Arithmetic, Safety, Reading
2	2	Remedial Reading, Reading
4	2	Social Studies, Arithmetic
5	3	Spelling, Social Studies, English
6	2	Reading (advanced), Reading (slow)
7	2	Science, English
8	2	Mathematics and History
9	2	Reading and English, Remedial Reading
10	2	General Business and Mathematics
11	1	Chemistry
12	1	American Problems
College Undergraduate	6*	Tests and Measurements, Music for Elementary Teachers, Teaching of Reading, Social Foundations, Mathematics for Elementary Teachers, Reading
Graduate	2*	Counseling Techniques, Reading

*Includes one class in which both graduates and undergraduates participated. Therefore, total is more than actual observations.

while making certain that the proper interval and categories had been checked. Two or more checks had to be made on a sheet containing twenty-three possibilities for each time interval. Furthermore, at that stage in development of the instruments, visual verification of length of elapsed time between categorization had to be made by reference to a clock whose sweeping second hand was clearly visible to the observers. No functional guide sheets for the recording instrument had been developed at that time.

Form B (see Appendix C) provided a grid system developed from two dimensions, the Sign Dimension and Function Dimension, and necessitated the use of successive numbers with a distinctive symbol for each instance of change in the Source Dimension. Form B was designed to provide a procedure for categorizing all behavior, but because of the difficulties they experienced in handling it, the observers in the pilot study used this form for only two untimed observations. It was their subjective judgment that Form B offered little improvement over Form A. Efforts at using Form B in the training period demonstrated that it was more difficult to handle mechanically and yielded less reliable results.

The participants in the pilot study made recommendations for improvements in the mechanical organization of procedures and modifications in category definitions as well as providing a series of examples of behaviors which were difficult or impossible to categorize. These results were communicated to the project staff and used as a basis for revision of the system for classification.

A valuable activity of the pilot study was the preparation of two 15-minute simultaneous sound films which were made during two observations of the classes by the observers. These films were made available to the project staff and were used to check the results of the two pilot study teams against the results of the pilot observations. The degree of reliability between the judgments of the pilot observers and the research staff was checked through the use of these films.

Reliability of Observations - Pilot Study.--A percentage of congruence was computed for each observation made during the pilot study in order to provide an indication of the degree of reliability possible at this stage of development of the system of categories. The reliability was computed in the following manner:

> The checks for each time interval were inspected for congruence between the two observers. Whenever there was a discrepancy in one or more of the checks within a time interval it was marked as an error. The total number of errors was subtracted from the total number of intervals for the observation and the percentage of congruence was then computed.

The percentage of congruence ranged from 70 to 98 with the modal percentage being 92, the median 85, and the mean 87.9. As might be expected, the percentage of congruence tended to increase with increased familiarity and routinization of the observational procedures. Table #2 provides a summary of the pilot team reliability. It should be noted that the tendency toward congruence increased at the higher grade levels. A subjective "feeling" reported by the observers was that a "closed" or "structured" classroom situation produced a higher percentage of observer congruence than did an "open" or "permissive" one.

Table 2

Percent of Congruence by Grade Level and Subject Matter of Classroom Observations During the Pilot Study

Grade Level	Subject	Percent of Congruence	Time Interval
4	Arithmetic	84	15
2	Reading	83	15
5	Social Studies	85	15
1	Arithmetic	70	15
1	Safety	73	15
1	Reading	78	15
2	Remedial Reading	95	15
5	English	91	10
6	Reading (slow)	92	15
6	Individual Reading (advanced)	80	15
College	Music	93	15
College	Tests and Measurements	92	15
College Graduate	Counseling Technique	98	15
5	Spelling	88	15
4	Social Studies	77	15
9	Reading-Remedial	81	10
9	Reading	97	15
10	Mathematics	84	10
10	General Business	73	10
11	Chemistry	76	15
12	American Problems	92	10
8	History	92	10
8	Mathematics	78	10
7	English	80	10
7	Science	88	10
College	Teaching of Reading	93	Untimed
College	Social Foundations	91.3	Untimed
College	Mathematics for Elementary Teachers	83	10
College Graduate and Undergraduate	Reading	93	15

Modification of the Initial Instrument and Procedures

Analysis of the pilot study focused on (1) the adequacy of the four dimensions of the classification system, (2) the efficiency of procedures for observation, and (3) the usability of equipment and instruments designed to aid data collection. The analysis indicated that revisions were necessary to make the instrument more comprehensive, the procedures easier to follow, and the mechanics of observation and categorization more precise.

Particular inadequacies were noted in the Sign Dimension and Function Dimension of the system for classification in terms of its ability to discriminate among all observable teacher behaviors. The list of verbal and non-verbal behaviors which were not considered classifiable by the pilot study team was used as the basis for revision of the instrument. Since the system is situationally based and sufficient descriptions of the situations in which some of the behaviors occurred were not provided by the Arizona team, it was necessary to disregard some suggestions made or to hypothesize alternative situations which would make the coding of an encounter impossible or at best ambiguous. Various categories in the Sign Dimension were expanded and redefined as a result of this procedure and new categories were added to handle non-extemporaneous verbal behaviors reported by the pilot team.

An analysis of the uncodable samples included in the pilot study data indicated a lack of breadth in the **DEVELOP** and **REGULATE** categories of the Function Dimension as well as the necessity for broader definitions of sub-categories in the **ADMINISTER** category.

Additional suggestions designed to make further distinctions within the sub-categories already developed were put aside until the reliability of the system and the validity of the categories and sub-categories had been checked

The procedures were modified to eliminate the use of the five-second time interval for coding during observation on the strength of the recommendation of those involved in the pilot study Comparison of the coding data indicated that the five-second time span provided no information or descriptions beyond that available from use of the untimed and forced 10- and 15-second timed observations.

In order to aleviate the mechanical problem of having to refer to a common timepiece for synchronization of observations, a tape recording was made of numbers in sequence to correspond with the sheets upon which the record of observations was being made Since filmed sequences of teaching behavior were to be used in the next steps in the development of the taxonomy, the tape could be played during the observation without causing distraction of the viewers.

A final modification at this stage of development was the preparation of a category guide which could be moved across the check sheet to maintain the proper time-interval on the grid being used. Having thus revised the instrument and procedures, the major validation study was undertaken.

Major Validation Study

The next step in the process of developing the taxonomy was the testing of the system of classification and instruments through the use of filmed sequences of spontaneous teacher behaviors as data sources The major validation study was pursued in the following manner: (1) sources of data were investigated, (2) criteria for selection of kinescopes were established, (3) kinescopes were selected, (4) observers were trained, and (5) data was collected by observation of kinescopes.

Data Sources.--A listing of available records of teacher classroom behavior was made through correspondence with several educational institutions. The project directors then visited those institutions which could make their materials available for research use. Scores of kinescoped records of teaching were previewed in an effort to secure a sufficient number to complete the validation of the system of classification. Many difficulties were encountered before the final selection was made. It was discovered that very few unstructured kinescoped records of teacher behavior were available. Most of what is available has utilized videotape for recording, and permission has not been secured from the teacher and student subjects so that distribution and use of these records of teacher behavior by others was not possible. One further difficulty was that the bulk of such material was produced to illustrate specific concepts, approaches, and methodologies so the teaching behavior had been planned and staged.

Criteria for Selection.--Kinescopes were selected on the following criteria:

(1) Quality of reproduction;

(2) The spontaneous nature of the presentation; no staged teaching sequences by professional actors were admissible;

(3) Variety of subject matter taught;

(4) Variety of grade level of students;

(5) Range of behaviors anticipated on the basis of judgment during the preview observation.

Kinescoped sequences of 25 different classrooms were selected. With the exception of Physical Education, examples of performance type teaching activity were not included in the materials selected. It had been hoped that materials in such subjects as music, art, and home economics could be found, but none were available for inclusion in the study.

Because the filmed sequences were of spontaneous classroom behavior, the quality of reproduction was not uniformly good. However, frequent observation of a single episode made it possible to understand the oral communication in nearly all instances. The visual portion of the films caused no difficulty. Because the camera usually followed the action of the speaker, those sequences involving extensive student participation provided relatively fewer minutes of coverage of teacher behavior. This was to be expected, however, as a result of the selection process. One social studies film provided a very "open" discussion-type lesson; another a small group, unit approach; a shorthand class provided the teaching and review of a skill area; physical education furnished examples of teaching motor skills; a mathematics sequence illustrated the teaching of abstract math concepts; Spanish provided examples of introducing pupils to a new area of study. Each film provided either what is commonly identified as a unique approach or a different subject matter at a different grade level.

The filmed sequences included both male and female teachers, public school and university demonstration school teachers. Some of the lessons were characterized by a particular style of teaching, methodological approach or technique; others were completely unstructured, spontaneous examples of teaching typical of public school instruction. The use made of the film by the producing institution was not considered in either the selection or the observation and categorization of the behavior. In all cases the teacher in the kinescope was a regular classroom teacher confronting children with whom he was familiar in the teacher-student relationship. Table #3 presents grade level and subject matter of the films used in the validation study.

Training Procedure.--Four members of the research staff, one of whom had worked on the development and revision of the system of classification category definition and instruments, undertook a training and familiarization period. They used the two films of teacher behavior produced by the University of Arizona field study team during their live classroom observations. A kinescope of five short excerpts of classroom teaching, which provided different examples of subject matter, content, and various teaching techniques, was also used for training purposes.

All four coders met together to study and discuss the classification system and coding procedures. The films selected for the training period were viewed by the group as a whole to help familiarize them with the categorization system. At first, specific teacher behaviors were noted and examples of them discussed and analyzed. Practice in categorizing total observable behavior of short sequences was undertaken. Besides group viewings of the training films, each individual viewed the films and practiced categorizing the behaviors independently until he felt comfortable with the system, the instruments, and the procedures. The group was divided into two teams of

Table 3

Distribution by Grade Level and Subject Matter of Kinescopes Used in Major Validation Study

Grade 3	Spanish
Grade 3	Language Arts (Graphemes)
Grade 4	Mathematics
Elementary	Science
Elementary	Social Studies
Elementary	Mathematics
Junior High (Mentally Retarded)	Physical Education
Junior High	Core
Grade 8	Geography
Grade 8	Mathematics
Grade 9	Social Studies
Grade 9	Social Studies
Grade 9	Mathematics - Algebra I
Grade 10	Mathematics
Grade 10	Science
Grade 10	Biology
High School	English
Grade 11	Shorthand (Reel I)
Grade 11	Shorthand (Reel II)
Grade 12	Shorthand
Grade 12	Physics
Grade 12	English
Grade 12	Social Studies
College	Mathematics for Elementary Teachers
College	Reading

two members each to provide a basis for establishing reliability of classification. Each team then worked out responsibilities for running the projector and tape recorder and procedures for attaining maximum synchronization of the timed audio tape and kinescope. When trial observations indicated that the members of each team had attained a fair degree of consistency in observation and categorization, the validation study was undertaken.

Data Collection.--First, each team of two members viewed a kinescope completely through without interruption. During this viewing, initial classifications were made of the behaviors and patterns of behaviors that the teacher utilized. Each kinescope was then viewed three more times. The observed behaviors were classified three times--once with a forced coding at each 15-second interval, once with a forced coding at each 10-second interval, and once at random, without any set time interval. The latter procedure demanded a continuous categorization of all evidences of new or changing behaviors. After viewing about half the kinescopes, both teams decided that it was easier to classify the pattern of teacher behaviors in some of the films than in others and agreed that a partial viewing was sufficient to prepare the team for the validation process.

Members of the teams worked independently and did not compare results until the categorization of each film had been completed. Upon completion of the first coding of a kinescope, the members of the team compared the results of their coding and discussed any problems of timing, uncodable behaviors, or difficulty in hearing the audio-reproduction. A rough estimate of observer congruence was made by marking each time interval in which one or more disagreements in coding took place. Notes were taken on particular areas of difficulty in categorization. While each team was free to proceed with the viewing of the filmed sequences as it wished, reference to Tables #4 and #5 show that observations occurred approximately in the same sequence and that congruence on time interval observations was high. Following the initial viewing of the kinescopes, the usual pattern was to categorize the behavior at the 15-second interval first, but there were exceptions to this procedure. If the pattern of the sequence seemed fairly simple and constant, an untimed categorization or 10-second categorization may have been made first.

The untimed observations were conducted initially for short excerpts of each kinescope. The projector was allowed to run until one or both members of the team encountered difficulty in categorization of the teacher behaviors. At that time the projector was stopped and the team members compared results of their coding and discussed components of the teacher behavior which had proven difficult or impossible to categorize. Notes were made of uncodable behaviors for later discussion. The projector was then turned on again and observation continued until the next point of difficulty. Because the films had been viewed at least three times prior to this untimed categorization, the observers were able to anticipate the major behaviors and talk about the difficult points as they came up. One team found that by the end of the validation phase they could continue for twenty minutes on some kinescopes without stopping the machine.

When it was discovered that the inter-team's time-interval congruence was not improving with familiarity with the instrument, an effort was made to determine the cause. Difficulty in synchronization of observations was suspected. Therefore, four observations

Table 4

Sequence of Observation and Interval Reliability by Teams Observing Every Ten Seconds

Kinescope Subject	Grade Level	Team I Sequence of Observation	Team I Percent of Congruence	Team II Sequence of Observation	Team II Percent of Congruence
Biology	10	1	96.2	1	92.4
Physics	12	2	89.4	2	83.7
Social Studies	12	3	94.8	3	97.2
Math-Algebra I	9	4	83.6	4	86.1
Social Studies	9	5	97.4	5	92.8
Geography	8	6	96.8	6	97.7
Mathematics	8	7	97.5	7	94.2
Shorthand (Reel 1)	11	8	95.1	8	99.4
English	12	9	98.3	9	97.7
Teaching of Math	College	10	92.6	16	85.4
Reading	College	11	94.1	17	93.7
Spanish	3	12	93.9	10[a]	89.7

[a] Observations conducted simultaneously

Table 4--Continued

Kinescope Subject	Grade Level	Sequence of Observation	Percent of Congruence	Sequence of Observation	Percent of Congruence
English	3	13[a]	91.2	11[a]	97.5
Social Studies	Elementary	14	93.7	12	89.8
Mathematics	Elementary	15	97.1	13	94.2
Core	Jr. High	16	98.7	14	96.9
Physical Education	Jr. High (Mentally Retarded)	17	98.2	15	97.0
Science	Elementary	18	92.4	18	95.5
Mathematics	4	19	88.8	19	94.7
Mathematics	9	20	100.0	20	91.7
English	12	21	100.0	21	100.0
Shorthand	12	22	100.0	22	95.4
Social Studies	9	23	100.0	23	100.0
Science	10	24	99.9	24	89.6

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[a] Observations conducted simultaneously

Table 5

Sequence of Observation and Interval Reliability by Teams Observing Every Fifteen Seconds

		Team I		Team II	
Kinescope Subject	Grade Level	Sequence of Observation	Percent of Congruence	Sequence of Observation	Percent of Congruence
Biology	10	1	94.9	1	86.1
Physics	12	2	93.5	2	75.7
Social Studies	12	3	98.8	3	98.8
Math-Algebra I	9	4	89.7	4	93.6
Social Studies	9	5	97.1	5	96.6
Geography	8	6	98.6	6	97.8
Mathematics	8	7	99.4	7	98.8
Shorthand (Reel II)	11	8	97.2	8	97.3
Shorthand (Reel I)	11	9	99.1	9	98.1
English	12	10	99.1	10	99.1
Reading	College	11	91.3	College	98.5
Teaching of Math	College	12	93.7	12	89.2
Language Arts (Graphemes)	3	13[a]	77.3	11[a]	83.2

[a] Observations conducted simultaneously

Table 5--Continued

Kinescope Subject	Grade Level	Team I Sequence of Observation	 Percent of Congruence	Team II Sequence of Observation	 Percent of Congruence
Spanish	3	14[a]	90.9	12[a]	86.3
Social Studies	Elementary	15	94.9	13	96.9
Mathematics	Elementary	16	97.4	14	93.1
Core	Jr. High	17	100.0	15	95.3
Physical Education	Jr. High (Mentally Retarded)	18	94.6	16	93.7
Science	Elementary	19	93.3	19	99.0
Mathematics	4	20	97.3	20	94.9
Mathematics	9	21	100.0	21	100.0
English	12	22	100.0	22	85.7
Shorthand	12	23	93.3	23	100.0
Social Studies	9	24	100.0	24	93.3
Science	10	25	100.0	25	83.3

[a] Observations conducted simultaneously

of two films were conducted simultaneously by all four team members to permit a comparison of results for this factor.

Form A was used to record the time-interval observations. Two colors of Form A were used for ease in handling during the analysis of data. Blue sheets were used for 10-second observations and yellow sheets for 15-second observations. Form B, which had been considered unwieldly by the pilot study group, was used throughout this phase of the study for the untimed categorization. Copies of the revised instrument, the detailed coding instructions, and observation forms are included in Appendices D, E, and F respectively.

Following the testing of the categories and instrument with the kinescope sequences, one member of each team formed a new team. These two then conducted a series of six observations of live classroom teaching in a local elementary public school. Two observations were made in each of three rooms using Form B of the instrument in an untimed categorization. One observation was made in each class on succeeding days. A variety of situations was observed. The average length of time spent in categorization of behavior in each classroom was about 25 minutes.

After coding the behavior, the two observers compared their categorizations and made notes of special conditions to be considered in analyzing the data.

Procedures for Analysis of Data

Following data collection, analysis proceeded in this order: (1) comparisons were made of the different timed observations; (2) adjustments of discrepencies in coding were made; (3) information was collated; (4) profiles of teacher behaviors were prepared, and, (5) tabulations of substitute codings were made. The original research proposal did not envisage the use of time-interval observations in the collection of data. This procedure was undertaken in an effort to handle the great number and variety of behaviors anticipated in the ordinary classroom situation. It was expected that the initial observations with a set time-interval would permit clearer selection of behaviors and categorization. Having recorded data under these three different circumstances for the same teaching situation, it then became necessary to compare the types of data collected in each type observation and the sufficiency of the system of classification in each of the differing observation procedures. The observations made at forced time intervals provided a basis for checking the reliability of coding both within teams as well as between teams.

Adjustments were made on the timed sheets to eliminate the errors resulting from lack of synchronization of observation. All instances of disagreement of categorization wherein one of the coders marked the Sign Dimension SILENCE and the other marked another dimension were discounted in making comparisons of accuracy of categorization. All differences in the coding for each class at each time interval were then recorded on a single sheet, using different symbols to indicate the coding made by each recorder.

Profiles were prepared for each teacher on the basis of the untimed observations. A composite profile was prepared on the basis of each team's data.

Finally, a tabulation was made of all substitutions recorded within the Function Dimension by each observer.

CHAPTER V

SYSTEM FOR CLASSIFICATION

This study grew out of a concern for developing a means by which the content and procedures of teacher education might be made more demonstrably relevant to the acts of teaching. The question of what knowledge is basic to the development and control of classroom teaching behavior is essentially an empirical one, since teaching is an activity with unique elements, patterns, and functions. Teaching must be studied in its own right if it is to be understood and, thus, some degree of control over it be realized. A necessary first step was to identify and study the range of classroom teacher behaviors. The primary effort was directed toward developing a system of discrete categories into which observable teacher behaviors could be classified.

A View of Teaching

At its most global level, teaching is viewed as a process of interaction between teacher and student or students within a superior-subordinate relationship. Teaching is governed by the expectation that learning will result from this process of interaction. Teacher behaviors and learner behaviors, through interaction, are interdependent. It is recognized that teacher and learner may interchange roles, but a teacher as teacher behaves in a manner distinct from the behavior of the teacher when the roles are exchanged. This study was restricted to the description of observable teacher behaviors which are purposeful in nature and have a direct relationship to the role of the teacher as teacher in a classroom. Thus, each behavior is viewed as fulfilling a teaching function. Chapter III made explicit the rationale undergirding this view of teaching.

Dimensions of Teacher Behavior

The basic component of teacher behavior classified is called an encounter. Encounter is defined as a unit of behavior that serves a discernible function within a teaching situation. Each encounter must have a function and behaviors without purpose are not classified. An encounter begins when a function is observed and ends when that behavior has no function or when a shift to another teaching dimension is observed. Teacher behavior is viewed as having four dimensions--the Source Dimension, the Direction Dimension, the Sign Dimension, and the Function Dimension. One or more classifications are made in each dimension for each encounter according to the definitions and explanations presented below.

Source Dimension

The Source Dimension indicates the origin of a given encounter. Since all teacher behavior may be viewed as response to some type of stimulus, the distinction between the two source categories (RESPOND and ORIGINATE) is determined on the basis of immediacy of stimulation.

Originate. Teacher behavior is coded ORIGINATE if it appears that the teacher serves as the source of the behavior in that there is no aspect of the classroom situation which provides an immediately discernible explanation of the behavior. The undiscernible stimulation may be district expectations, professional training, teacher planning, etc., but the teacher is not interacting with elements in the immediate classroom environment.

Examples

> "Susan, will you read next?"
>
> "For the next few days it will be important for us to work in our small groups. During this time you should collect your material and prepare your reports."
>
> The teacher walks into the classroom and stands in front of the room waiting for students to take their seats and to become quiet.
>
> The teacher is silent for an extended period while a student is responding to a solicitation made by the teacher.*
>
> After hearing the answer to a question the teacher says, "Okay, let's take the next one."**

Respond. Teacher behavior is coded RESPOND if the behavior is in response to some discernible aspect of the classroom setting, i.e., student, instructional device, classroom disturbance, etc., since the teacher engages in the particular behavior in response to that source. The teacher's behavior may be either verbal or non-verbal. While this distinction is not made at the time of categorization it is necessary to provide examples of both verbal and non-verbal behaviors to illustrate the variety of behaviors categorized and provide the background information necessary to make situational decisions for categorization.

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*Since the focus of this study is limited to teacher behavior, the categorization of the examples which include a sampling of student behavior is concerned with the teacher's behavior alone. Instances of student behavior are included only to provide situational information necessary for the establishment of the proper category within each dimension.

**If the teacher comments on or reacts to the student's behavior the source is then changed to RESPOND. However, if the teacher continues to pursue his questioning, turns to another subject or provides additional information without giving recognition to the student's participation the ORIGINATE category is continued.

Examples

> The student asks, "Are we going to go to the library today?" and the teacher answers, "Do you think that a trip to the library is necessary at this time?"
>
> The teacher pulls down the window shade to keep light from shining in the eyes of a student.
>
> Upon hearing bell, the teacher says, "We'll have to finish this discussion tomorrow."
>
> The teacher motions to student who is talking to his neighbor indicating that he should turn around and be quiet.
>
> During a discussion of the planning of a social studies unit, the teacher asks a question to which a student responds. In turn, the teacher says, "I'm not sure that I agree with you, John, but I'll put it down (writing on the blackboard) anyway. After we have studied a little more maybe you'll change your mind."*

Direction Dimension

The Direction Dimension indicates the target (receptor) to which the teacher behavior is directed. In the interactive teaching process, the behavior of the teacher has a receptor or receptors. The four categories which compose this dimension (INDIVIDUAL,

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*In this encounter only the teacher's statement and activity included in quotation marks are coded RESPOND.

GROUP, CLASS, and OBJECT) are differentiated on the basis of composition of the classroom situation, arrangement of the classroom situation, and/or behavior which specifies the target (receptor).

Behavior that focuses on one person is coded INDIVIDUAL. It may be a case of special individualized instruction, personal assistance, or extemporaneous attention to the request or needs of a single student.

Behavior that focuses on more than one person but fewer than the total class is coded GROUP. This may occur during special group activity periods, extemporaneous activity in which the teacher selects out several students for special attention, or in regular routine such as when the teacher requests all those staying for lunch to line up to wash their hands or all girls to get their coats, etc.

Behavior which focuses on all students present for the purposes of the class period is coded CLASS. The absence of a student or students because of illness or in pursuit of a routine activity, i.e., private music lessons, restroom, administrative errand, etc., is not sufficient to change the CLASS focus.

Behavior which focuses on an inanimate element in the physical environment of the classroom is coded OBJECT. This includes behaviors in which teacher attention is directed to running the slide projector, setting up experiments and other preparatory activity undertaken before the endeavor to present the lesson to the class.

Sign Dimension

The Sign Dimension indicates the mode of communication of a given encounter. Behavior characterized by spontaneous speech is coded SPEAK. The bulk of oral transmissions will fall within this category.

Oral behavior that involves the reading of written material is coded READ. Included are such behaviors as reading test items, supplementary material, interpretative reading in English or speech classes, or giving dictation in shorthand, English, etc.

Behavior that entails purposive movement of the body such as to point a finger, nod the head, or indicate size, shape, etc., by some movement of the body or appendages is coded GESTURE.

Behavior that involves the demonstration of scientific phenomena, the exhibition of pictures or illustrations, drawing pictures, illustrations, graphs, etc., singing, piano playing or dramatic representation is coded PERFORM.

Behavior that communicates through writing, such as use of the chalkboard to present an outline, transcribe a mathematics problem, note ideas from class discussion, etc., is coded WRITE. The presentation of numbers and symbols is included within this category, but the drawing of mathematical figures is included under PERFORM.

Behavior that is characterized by inarticulate sounds of mirth and/or derision is coded LAUGH. It may be in unison with the class or individual.

The absence of any other sign dimension is coded SILENCE. This category accounts for behaviors primarily of two types. When the teacher has asked a question or permitted a student to interrupt, no classification is made under the function dimension. When the teacher has structured the situation so that the students are engaged in an activity of their own which does not require active teacher participation but the teacher walks about the room or stands and observes students, the sign dimension remains SILENCE with a function classification of ADMINISTER, Proctor.

Frequently more than one mode of behavior will occur within a given encounter. While each mode may appear in isolation, dual and triple manifestations or signs are both possible and common. The possible combinations and examples of dual modes of behavior follow:

SPEAK-GESTURE:	The teacher calls on someone and points at him at the same time.
SPEAK-PERFORM:	While conducting an experiment in science class the teacher describes what he is doing or discusses the procedures.
SPEAK-WRITE:	"The shorthand symbol for 'acceptable' is written like this." (While speaking he is writing on the board.)
READ-GESTURE:	While reading from the arithmetic textbook the teacher motions to the student to turn around in his seat.
READ-PERFORM:	While dictating from the shorthand textbook the teacher is handling a stopwatch with which he is timing the exercise.
READ-WRITE:	The teacher reads a mathematics problem from a book while writing it on the board.
GESTURE-PERFORM:	While using a film strip projector the teacher indicates with his hand that a child should sit down in his seat.
GESTURE-WRITE:	(This combination is possible but was not observed.) While writing on the board, the teacher nods approval of a student utterance or behavior.
PERFORM-WRITE:	(This combination of modes of behavior is also a possibility which was not observed.) While operating an overhead projector, the teacher could write on the transparency.

LAUGH-GESTURE:	While laughing, the teacher motions for the class to become quiet or for a student to sit down.
LAUGH-PERFORM:	While assisting a student with an experiment involving air pressure, the teacher laughs at a student's efforts to blow a paper off a funnel.
LAUGH-WRITE:	While writing on the board, the teacher joins the class in laughter at an error he makes.

Triple occurrences are much less frequent but also possible. Some teachers are particularly susceptible to this type of complex behavior.

SPEAK-GESTURE-PERFORM:	While directing a stream of air across the top of a piece of paper the teacher nods in agreement to the student's reply and says, "Yes, removing the pressure on the top of the paper causes the edge to curl up."
SPEAK-GESTURE-WRITE:	The teacher nods in agreement and writes the student's response on the board while saying, "That's correct."
SPEAK-PERFORM-WRITE:	While operating the overhead projector the teacher writes on the transparency and comments on the information he is writing.
READ-PERFORM-GESTURE:	Shorthand teacher nods to reassure student while timing a dictation exercise which the teacher is reading.
READ-GESTURE-WRITE:	While shaking his head no, the teacher reads the correct response from a book and writes the term which was missed on the board. "The abscissa of a point in which the graph of the equation cuts the x-axis is called the x-intercept." ("x-intercept" is written on the board.)

Function Dimension

The Function Dimension provides a system of categories for coding the significant teacher behaviors in terms of goal-directed learning or the purpose the teacher serves in the classroom. A variety of goals have been established by our pluralistic society for the schools. While any given set of goals or objectives may contain more or fewer statements than another, the teacher's role in meeting these objectives has been conceptualized as involving three essential tasks. These tasks are oriented toward subject matter or content, interpersonal relations between teacher and student, and the facilitation of the learning process. Five major categories encompass the purposes of the teacher behavior and form the Function Dimension. They are: **STRUCTURE, DEVELOP, ADMINISTER, REGULATE,** and **EVALUATE.**

While in a classical system of classification each specimen is categorized in only one way, the system of classification devised for this study takes into consideration the interrelatedness of a teacher's behavior and permits classification of a given specimen (encounter) in more than one way. In short, an encounter may serve more than one function.

STRUCTURE

Encounters which **STRUCTURE** set the context for subsequent behaviors by initiating, providing focus, and launching a full unit, a single class session, or a single topic. Both subject matter and/or process may be objects of **STRUCTURE**. Decisions are made by the teacher relative to what is to be studied, the framework in which study is to proceed, how elements of study are to be ordered, and what student activities are to be required. The structuring function is achieved through behaviors that Initiate, Order, and Assign.

Initiate. Behaviors which specifically serve to introduce and launch an activity, task or area of study are coded Initiate.

Examples

"For the past week we have been working in our committees and preparing reports. Today you should be ready to present your committee reports. We had decided that Bob's committee would be first. Are there any questions before we begin?"

The teacher has a toy train in front of him. As he changes the order of cars, he asks the class, "In what order can we place the cars in a train?"

In an elementary classroom a special teacher (not the classroom teacher) is seated at the front and she begins to talk to the class about languages as an introduction to the study of Spanish. She asks, "How many of you know someone who speaks a foreign language?" (Hands go up all over the room.) "What languages do they speak?" (Child responds, "Greek.") Teacher replies, "Greek." (Another child suggests French, etc.) Many languages are suggested and the teacher asks questions such as: "Where did they learn them?" "Do you know any other languages?", etc.

In a senior Social Studies class the teacher reviews the activities of the preceding planning sessions before dismissing the class to meet in small groups.

"The library committee will be meeting with Mr. Brown, the librarian, and will want to find out what resources are available on the topic of social attitudes of early twentieth century American writers. The committee meeting with Mr. Swanson is to investigate the development of a national theater . . ."

Order. Behaviors which arrange previously initiated elements of subject matter and/or process are coded Order. These may establish a time table for activities or sequence for the consideration of future elements of the area of study set forth in the initiating behavior.

Examples

"On Monday of next week the committee on library resources will report. On Tuesday the finance committee will be on. On Wednesday the committee on interviews with resource personnel will give their presentation and finally on Thursday we will hear from the group working with Mr. Newman on the art of the period."

"On the board are the shorthand symbols which I will point to and I want you to say what they are out loud. But before we do that we will read the letter written in your textbook and then I'll give you some dictation."

"First we may substitute a specific number for $\underline{x}$ and then solve for the corresponding value of $\underline{y}$. Next we may show this on a graph in the following manner:" (Followed by a demonstration of the procedure on the chalkboard.)

Assign. All behaviors which designate a required activity to be performed subsequently by the students (in the future) are categorized Assign.

Examples

"For tomorrow do pages 55 and 56 in your workbook."

"Before beginning your committee work I want each of you to formulate at least five questions which you believe it is necessary for your committee to answer. These questions are to be written out."

"Read the next story in your text, silently."

DEVELOP

Once the context and focus of study have been established, some sort of development or elaboration must take place so that the objectives of such study may be achieved. During this period of development a process of minor refocusing and extension within the established STRUCTURE takes place. Facts, ideas, and concepts may be introduced by the teacher as the object of focus is developed (goals or objectives are pursued). This elaboration and extension of the subject matter and/or process within an established structure is coded DEVELOP. Not all teacher behavior designed to extend and elaborate the subject matter is successful in its initial expression, however. Erroneous thinking by students may persist unless it is corrected. Therefore, from time to time the teacher engages in behavior whose function is to check student understanding, conduct a written quiz or examination and/or elicit a verbal response that states facts, ideas, concepts, etc. The developing function is achieved through behaviors that *Inform*, *Explain*, *Summarize*, *Check*, *Elicit*, *Test*, *Reinforce*, and *Stimulate*.

Inform. Behaviors which develop the content by providing a statement of facts, ideas, concepts, or a demonstration of a procedure or method of acting, writing, performing, etc., are coded *Inform*.

Examples

"The shorthand symbol for 'group' is written in this way." This statement is followed by a demonstration of how it is written on the board.

The Spanish teacher goes from student to student and says, "*Comò se llama* means 'What is your name?'"

"When standing on your head be sure to begin from a crouching position with your arms forming a triangle brace on each side of your head."

During a Social Studies lesson the teacher says, "The British are apt to take quite a different view of the American Revolution when they write books about it."

"The distributive law is very important. In multiplying 12 by 6 we use the distributive law. $12 \times 6 = (10 + 2) \times 6 = (10 \times 6) + (2 \times 6)$."

Explain. Behaviors which demonstrate relationships between ideas, objects, principles, etc., are coded Explain.

Examples

During a science experiment the teacher says, "The heated can collapses when it is cooled suddenly because the heated air exerts less pressure than the cold air outside."

Following a discussion of ways of discovering the intent of an author, the English teacher says, "It is necessary to discover the author's purpose, John, before you can interpret what he is writing. For example, a satire, if taken seriously, may lead you to suspect the author of the very error he is lampooning."

"We call it a linear equation because the graph of the equation is a straight line. It is sufficient to plot two points on the graph and draw the straight line if the coordinates satisfy the original equation."

Summarize. Behaviors which restate principal points in brief form are coded Summarize.

Examples

Following a discussion of procedures to pursue a new unit in Social Studies the teacher says, "Then it is decided that we will divide into committees to investigate the areas we have identified on the board."

After presenting several examples the algebra teacher says, "We see then that the graph of an equation contains all points whose coordinates satisfy the equation and no point whose coordinates do not satisfy the equation."

"We need to know the author's purpose, the period in which he was writing and the audience to which he was addressing himself before we can begin to interpret what he says."

Check. Behaviors that require a student to respond in a manner which demonstrates his understanding of relationships are coded Check. Generally those behaviors coded in this category contain the words why and how.

Examples

"Why does the ball stay on the end of the pipe even when the vacuum machine is running?", the science teacher asks.

"Why does the paper stick to the top of the fan when it is turned on?"

"How do you tell the difference between a male and a female frog by just looking at a picture of it?"

"How might a British author or artist depict this same battle?"

Elicit. Behaviors which solicit a verbal response that states facts, ideas, concepts, etc., are coded Elicit. These behaviors usually include the words what, where, when, or who in their formulation.

Examples

During an algebra lesson the teacher asks, 'What is the value of x?"

"When does the female frog lay her eggs?"

"Who is the author of this passage?"

The mathematics teacher asks, "Can you give me the name of this principle?"

"How would you say, 'What is your name?' in Spanish?" the teacher asks.

Test. Behaviors which require written student responses to dictated questions and the pronunciation of spelling words, or the supplying of answers to test questions in order that students may check for answers when no explanation by the teacher is involved are coded Test.

Examples

"Refirgerator. Always put the milk in the refrigerator. Refrigerator." "Satisfactory. Be sure that your answer is satisfactory. Satisfactory."

"What is the method called by which the male frog forces the eggs from the body of the female frog?"

"Number one is spelled, r-e-f-r-i-g-e-r-a-t-o-r."

"The answer to number three is "large intestine."

Reinforce.

Behaviors which confirm or sustain an idea, approach, or method through reiteration are coded Reinforce.

Examples

Having Informed the class that Comò se llama means "What is your name?" the Spanish teacher repeats the phrase, "Comò se llama? Comò se llama? Comò se llama?"

(After the student has answered a question, the teacher repeats or paraphrases the answer. Often it is preceded or followed by an evaluative statement of the Stereotype sub-category.) "Right. X is equal to two." "Seven, it is. Good.*

Following a discussion of procedures for preparation and presentation of reports, the teacher says, "Be sure that each group has included a statement of purpose, sources used and time spent on collecting information. These are all elements we agreed needed to be included in our reports."

While observing the gym class performing tumbling exercises the teacher says, "Be sure to keep your shoulder tucked under."

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*The underlined word is coded Stereotype.

Stimulate.

Behaviors which serve to encourage student involvement and participation are coded Stimulate.*

Examples

During the introduction of new vocabulary, the reading teacher says, "I'd like to see every hand up on this question. You should have a guess, even if you aren't sure of the answer."

"I hope everyone will get a star today." (The implication here is that the teacher hopes everyone will do his best so he can be rewarded by the teacher.)

When the teacher asks a question with the expectation of response from the class and little or only tentative response is forthcoming he continues to prepare the ground work for a response by moving the different cars of the toy train he has in front of him from one position to another and asking if each position is a possibility for the proper composition of the train. His oral utterances are limited to, "How about this? And this? Or this? Or this? This? And this?"

ADMINISTER Closely allied, and frequently integrated, with activities that DEVELOP subject matter and/or process, are behaviors that serve administrative functions. The teacher executes certain tasks whose functions establish and maintain classroom routine and procedure. Elements of the classroom environment (personal and physical) are arranged; media, supplies, or materials are provided and their use is determined and coordinated; and student activity is monitored. The major function coded ADMINISTER, is achieved through behaviors that Manipulate, Manage Materiel, Routinize, and Proctor.

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*The Stimulate sub-category of Develop is a borderline subcategory which further testing may demonstrate to be more consistently a part of the Regulate category which will be discussed below.

Manipulate.

Behaviors which arrange elements of the classroom environment, personal and physical or function to maintain the routine by causing others to do something are coded Manipulate.

Examples

The teacher says, "John." (This behavior is an indication of who should respond or perform next.)

(No oral activity is performed, but the teacher points with his finger or nods his head in the direction of a student to indicate that he is to respond to a question or conduct himself in some mutually understood manner.)

The teacher opens or closes the door or window to regulate the room temperature, shut out noise, etc.

"Class, open your books to page 165."

"Girls, line up please for recess."

"Go to the board and work the problem for us."

The teacher asks, "Will you close the door for us, please, Marion?"

Manage Materiel. Behaviors which provide or coordinate use of media, supplies, or materials are coded Manage Materiel. Usually these behaviors are non-verbal and are accompanied by verbal behavior which is categorized in another manner.

Examples

While giving a speed dictation test in shorthand, the teacher holds and monitors a stop watch.

The teacher distributes test papers or returns corrected papers.

The teacher lowers the shades, pulls down the screen and shows slides with a projector while maintaining the classroom climate and continuing the development of ideas relevant to the topic of the day. The activity related to showing the slides is included in this sub-category.

The teacher points to charts, illustrations or material written on the board as an example of the fact, idea, concept or principle he is discussing.

Routine. Behaviors which request information regarding compliance with individual, class or school expectations and regulations are coded Routinize. The bulk of such behaviors fall into the beginning or ending of a class period.

Examples

"John, did you say you won't be here tomorrow?"

"Laurie, did you bring the money from home for your pictures?"

"Do you think your mother could help you with your arithmetic tonight, Andy?"

"Have you finished your assignment, class?"

Proctor.

Behaviors which monitor the classroom during group activity, silent written testing, student teacher performance, student reports, etc., are coded Proctor.

Examples

The teacher stands or walks without speaking or otherwise communicating with the class members during a test. (Possible intended purposes are those of curtailing temptation to cheat, being available to answer questions, or maintaining the normal discipline.)

The teacher walks from group to group as they are working independently without participating while the students continue to function on their own initiative.

The teacher sits at the back of the room and observes a student teacher, a student who is reporting, or the class activity while another person is in charge.

REGULATE Encounters which Regulate focus on standards for student behavior. Encounters which implement these standards through teacher behaviors are instrumental in facilitating or inhibiting learning and therefore have relevance to the content objectives. The behaviors may function to provide support, express confidence, or commendation, and to show empathy toward a student or students, or they may serve to reprimand, threaten, and punish the student so as to restrict his behavior and achieve conformity.

Interpersonal relations are further regulated by teacher behaviors which ascertain whether or not the student is involved in the given situation and provide direct personal help for a student or students. The teacher may also facilitate or impede interaction by recognition and interpretation of his own behavior. Regulative functions are performed when behaviors Set Standard, Support, Restrict, Assist, Inquire, or Monitor-Self.

Set Standard. Behaviors which establish and maintain interpersonal relations by direct imposition or guidance of development of standards of behavior are coded Set Standard.

Examples

"I'll leave it up to the class, what should be done about people who don't turn in their lesson assignments?"

"James, will you please spit out your gum?"

Having said, "Let's not wave our arms about so much when I call on you," the teacher continues, "I can see just as well if you simply lift them quietly." (The first statement is coded Regulate-Restrict. The second, Regulate-Set Standard.)

After a student speaks out of turn the teacher asks, "Class, why don't we speak out of turn in this class?"

The teacher stands up straight in front of the class with hands to his side and waits until the students follow his example.

"Keep your hands at your sides while in line."

Support. Behaviors which express confidence, commendation or empathy are coded Support. Supportive behavior is usually in response to some student behavior and plays a major role in implementing the class standards. It may be through oral communication or a physical act.

Examples

"Very good, Ellen."

After encouraging the student by saying, "Come on, Martha," the teacher continues, "I know you know the answer." (The first statement is coded Develop-Stimulate, and the second Regulate-Support.)

When the student makes an error and appears embarrassed the teacher says with a smile, "It is easy to make a mistake like that."

(A smile and nod of the head while a student is responding to a request by the teacher or while he is making a presentation according to some prior arrangement.)

Restrict. Behaviors which reprimand, threaten, or punish a student are coded Restrict. As in the case of supportive behavior, this function may be fulfilled by a physical act as well as an act of oral communication.

Examples

"We won't go on until Jimmy is finished, too."

"No, Sue. That's not the way to do it."

The teacher admonishes the class, "If you don't quiet down, we will miss our recess."

During the mathematics class the teacher says, "If your assignment isn't finished, I'll have to see about some more homework for tonight."

"You didn't put much thought into that answer, did you?"

"Anyone should be able to figure this problem out," the teacher says after several erroneous attempts have been made by different students.

(The teacher shakes her head or wags her finger at the student to deter him from his present activity.)

Assist. Behaviors which provide personal assistance to a student and which are not codable as some other function, are categorized Assist. On some occasions it is necessary for the teacher to provide personal help for an individual student by doing something for him or giving advice as requested. Frequently this aspect of the teacher's behavior is visible but not audible to other receptors (observers) of the behavior.

Examples

The teacher addresses an individual, "Let me see if I can find out what the problem is."

(The teacher is observed moving to a student's desk when the student raises his hand. The teacher bends over the desk and talks to the student, but the conversation is not audible.)

(The teacher sharpens a pencil for a child having difficulty turning the pencil sharpener handle.)

The teacher asks, "Can I help you get your committee discussion going, Ruth?"

A student raises his hand and is called on. He asks, "How do you work number twelve?" The teacher moves to the student's desk and talks to him individually.

Inquire.

Behaviors which ascertain the extent of student involvement in class activity both in and out of the classroom are coded Inquire.

Examples

"Do you have your book open to the right page, Jim?"

Following a lengthy student presentation the teacher asks, "How many have been able to follow Ted's explanation?"

After presenting several examples of an algebraic principle the teacher asks, "Is there anyone who doesn't understand what we are doing?"

Monitor-Self. Behaviors which demonstrate a recognition and interpretation of the teacher's own behavior or checking of his understanding and interpretation of student behavior is coded Monitor-Self.

Examples

"Did you mean that the forces on the left were British troops, Carolyn?"

The teacher notices that he has copied the arithmetic problem wrong. He says, "Oops! I made a goof."

In response to an ambiguous question the teacher says, "I don't know how to go about answering your question."

"Thank you for pointing out the error I made on the board, Terry."

A student calls a mistake to the teacher's attention and he replies, "I'm sorry. I meant to say that x is equal to six."

"Did you say 'grasping' or 'clasping'?"

EVALUATE The final category in the system is composed of those behaviors which are designed to ascertain the relevance or correctness of subject matter and/or process. They are categorized EVALUATE. Behaviors which serve this function are fundamental both to the content task and to establishing interpersonal relations. Without some judgmental behavior by the teacher, focus cannot be established, learning activities developed, or interpersonal relations maintained. The teacher can ascertain the degree of relevance or correctness of subject matter, process, or student behavior in several ways. The evaluative function is achieved through behaviors which Appraise, Opine, or Stereotype.

Appraise. Behaviors which verify a fact, statement, or idea by appealing to evidence or authority are coded Appraise.

Examples

"According to our text the prevailing winds are westerly."

The English teacher responds to a student's inquiry which has posed two alternatives, "I have heard it interpreted both ways, John."

"The introduction to the dictionary tells us that the order of the pronunciation is randomly selected, rather than on the basis of majority preference."

Opine. Behaviors which make judgments on the basis of personal values and beliefs held by the teacher are coded Opine.

Examples

When a discussion develops over whether or not to stand while speaking, the teacher says, "I think you had better sit down."

In an elementary class the teacher says, "A better way of holding your pencil would be like this."

During a flutophone lesson the teacher says, "I believe it would sound better if you took your finger off the second hole and put it on the third hole."

The art teacher asks, "Don't you think red and blue go well together, Mary?" (Here the inference is that the teacher likes red and blue better than red and purple.)

During a social studies planning session the teacher says, "I think going into a discussion of tariffs at this point is going to lead us astray."

Stereotype.

Behaviors which evaluate without reference to any criteria are coded Stereotype. They tend to be an automatic type acceptance or rejection of a response by a student.

Examples

The teacher responds, "That's right," and goes on with his questioning.

"No" (or "Yes"), says the teacher and proceeds to call upon another student for a response.

"Okay," "Um-hmm," or "Good." (Said without reference to the student or his response and without inflection indicating confidence, commendation or other personal support for the responder. A nod of the head indicating acceptance of the response or student behavior, either affirmative or negative.)

CHAPTER VI

RESULTS OF CODING

The major purpose of this chapter is to provide descriptions of the results of the coding of teacher behaviors observed on filmed sequences of spontaneous teacher behaviors. Following a discussion of factors of reliability, the adequacy of the system of classification is considered. Analysis of timed and untimed procedures and of disagreements in coding are then reported.

Reliability

In order to determine the reliability of the coding, all coded sheets of Form A were examined. Agreement between members of each team (intra) and the agreement between the two teams (inter) for each category was obtained. As the codings were compared, disagreements were indicated by marking omissions and substitutions of one classification for another.

Intra Group.--Two teams of two members each were used for the coding of teacher behavior; except for two filmed sequences, the teams observed and checked the sequences independently. As soon as a filmed sequence had been coded, members of each team checked for disagreements. Instances of disagreement which could be resolved were changed to agreements. Instances of disagreements which could be resolved were those caused by timing, inability to hear, too rapid sequence of behaviors, or coder uncertainty in interpretation of behavior category.

After all coding was completed, a comparison was made of the coded sheets of the members of each team--that is, coded sheets of member A were compared with those of member B of Team I; and coded sheets of member C were compared with those of member D of Team II. Disagreements were marked on the sheets of member A of Team I and on those of member C of Team II. Disagreement was defined as a substitution of a category in the coding of an encounter by a team member or as an omission of a coding instance by a member of a team. Agreement was defined as identical coding of a particular encounter by both team members. As the disagreements were noted, substitutions of one major category of behavior for another and/or one sub-category of behavior for another were indicated.

After all coding had been checked, the total number of codings made for each dimension of teacher behavior--source, sign, and function--was calculated and the number of coded agreements was recorded. In addition to the dimension level, the number of coded agreements, omissions and substitutions for the sign and function categories was determined in order to provide further information about the instrument. The procedures used are explained in detail below.

Percentage of agreement for each major dimension of teacher behavior and for each of the function categories was determined. The coded sheets were examined to determine the disagreements between categories within each behavior dimension. Colored markings were used on the coded sheets to indicate the points of disagreement. The total number of possible codings was determined by adding the incidence of agreement to the incidence of omissions and substitutions on each series of coded sheets. The number of agreements was determined by counting the total number of encounters coded identically by any of the observers within each category. The number of instances of omission was determined by counting those cases in which member A omitted what member B coded and those cases in which member B omitted that which A coded. The same procedure was followed for members C and D of Team II. In order to obtain the percentage of agreement, the number of agreements was divided by the total possible codings. The formula for this computation may be written $P_a = \frac{A}{T_p}$. P_a is the percentage of agreement. A is the total instance of agreement; T_p is the total instances of coding; $T_p = A + (O_i + S_i) + (O_{ii} + S_{ii})$. Again A is the total instances of agreement. O_i is the total omissions by Team I; S_i is the instances of substitution by Team II respectively.

Table 6 shows that there was a high percentage of agreement in the codings by both groups, ranging from 93.8 to 99.3 percent for both the 10- and 15-second interval timings.

Table 6

Percentage of Agreement Between Members of Each Coding Team for Each Dimension

	15-Second		10-Second	
Category	Team I (A-B)	Team II (C-D)	Team I (A-B)	Team II (C-D)
Sign	99.0	98.2	99.3	97.8
Source	98.3	98.1	93.8	98.7
Function	95.9	95.0	94.4	95.5

Table 7 shows the frequency of matrices within the Function Dimension according to the percentage of agreement between team members of each team for all observations at the 15-second interval. Using a base of 25 filmed sequences for the 15-second observations with five categories within the Function Dimension for each filmed sequence, a total of 125 different matrices for coding is possible. However, there were no instances of coding in 25 matrices, thus providing a total of 100 matrices for codings. Both Teams I and II had 100 percent agreement in all instances of coding within 59 of the matrices. In 29 of the matrices the percentage of agreement was in the range of 90-99 percent. Only nine matrices had percentages of agreement between 70-89 percent. Three matrices were below 69 percent in agreement. Reference to Table 12 in Appendix G will show that one reason for these low percentages was the low number of instances of codings in each of the relevant categories.

Table 7

Frequency of Matrices by Percentage of Intra-Group Agreement
of Categories of Function - 15-Second Interval

	Team I	Team II
Percent of Agreement	Number of Matrices	Number of Matrices
100	59	59
90-99	29	24
80-89	6	8
70-79	3	5
Below 70	3	4
Totals	100	100

Further reference to Table 12 reveals that in two of the three cases, one with 50 percent agreement and the other with 25 percent agreement, there were only four instances of categorization possible. In the third instance with zero percent, there was only one instance possible. Some categories with high percentages of agreement also have a low number of instances of coding. However, agreement was achieved in these areas even with few instances of the given behavior being recorded during observation of the particular filmed sequence.

In 24 of the total 100 matrices, the percentage of agreement was in the range of 90-99 percent for Team II. In 13 matrices, the percentage of agreement was between 70 and 89 percent. There were only four instances of categories below 69 percent in agreement.

Table 13 in Appendix G will reveal that there were only a total of six instances for coding possible for the category with 66.7 percent agreement; two instances for the category with 50 percent agreement; and three instances for the category with zero percent agreement.

Table 8 shows the frequency of matrices by the percentage of agreement of categories within the Function Dimension for each team of observers at the 10-second interval. Using a base of 24 filmed sequences observed at the 10-second interval with five categories within the Function Dimension for each observation, a possibility of 120 matrices is established. During these observations no instances of teacher behavior were observed in 25 of the matrices. Therefore, a working total of 95 matrices resulted. Team I had 100 percent agreement on 44 of the total 95 possible matrices. In 31 of the matrices the percentage of agreement was in the range of 90-99 percent. In 14, the percentage of agreement was between 70 and 89 percent. In only six instances was the percentage of agreement below 70 percent. In four of these six matrices, the percentage of agreement was 66.7 percent and one each had 60.0 and 50.0 percent. In the instances with 60 and 50 percent and in three of the matrices with 66.7 percent agreement, the total instances recorded were relatively low, ranging from two to six. In the other case with 66.7 percent agreement, there were 15 total possible instances with agreement on ten.

Table 8

Frequency of Matrices by Percentage of Intra-Group Agreement of Categories of Function - 10-Second Interval

	Team I	Team II
Percent of Agreement	Number of Matrices	Number of Matrices
100	44	54
90-99	31	30
80-89	12	8
70-79	2	1
Below 70	6	2
Totals	95	95

Team II had 100 percent agreement on 54 of the total of 95 possible matrices. In 30 of the matrices, the percentage of agreement was in the range of 90-99 percent. In 13 matrices the percentage of agreement was between 70-89 percent. In only two instances was the percentage of agreement below 70 percent. Reference to Table 8 reveals that there were only six instances of coding in one category for a 66.7 percentage of agreement. The other case contained 17 instances of coding and resulted in 64.7 percent agreement. The low number of instances recorded may have prejudiced the results of the first category with a relatively low percentage of agreement, but some other explanation must be sought for the other matrix with the low percentage of agreement. A check of the sequence of observations shows that this filmed sequence was one of the first to be coded and unfamiliarity with the category definition may have played a part in the low percentage of agreement.

Inter Group.--In order to obtain an additional indication of the degree of reliability of coding, the coded sheets of member A of Team I were compared with the coded sheets of member C of Team II. Disagreements between members of each team had been indicated on these coded sheets. Except for two films, each team had viewed the filmed sequences independently and had not discussed their results. While the differences in codings between Teams I and II were not discussed or modified, an instance on which three persons agreed was counted as an agreement. After the coded sheets for member A and member C had been compared and disagreements marked, the total number of codings made for each coded dimension of teacher behavior--sign source, and function--was calculated and the number of coded agreements determined. The total number of codings was defined as the sum of agreements plus all other coding marks made by each team. The procedures for determining the percentage of agreement were the same as those used for the intra-group reliability and were explained on page 106.

Omissions in coding and substitutions of one category of behavior for another were indicated. Instances in which there was a difference concerning silence and some other behaviors were eliminated from further calculation. Since the teams did not discuss their codings, these instances were assumed to be a viewing problem caused by lack of congruence of observation and not a disagreement as to the behavior recorded. The two teams were in effect viewing and coding different behaviors at those instances since a teacher speaking, reading, writing, performing, or gesturing is not easily confused with a teacher not exhibiting these behaviors. A further discussion of the timing problem is included on pages 123-130.

Table 9 shows that the agreement for the sign and source dimensions of behavior was relatively high for this stage of instrument development ranging from 84.4 to 87.2 percent on both the 10- and 15-second codings. Percentage of agreement for the sign and source dimensions was nearly identical for both the 10- and 15-second timed intervals.

Table 9

Percentage of Agreement Between
Teams for Each Dimension

Dimension	15-Second	10-Second
Sign	84.4	85.4
Source	87.2	85.4
Function	49.2	52.4

The Function Dimension showed the lowest percentage of agreement with 49.2 percent for the 15-second timing and 52.4 percent for the 10-second timing. After analyzing the coded sheets, it became apparent that difference in timing (the two groups did not view the films at the same time) played a major role in the lack of reliability as measured in this study. Eliminating the silence-activity instances of disagreement did not eliminate the major differences caused by timing. This interpretation is supported by results of two films which were viewed at the same time by both coding teams. An examination of the results of these observations revealed a significantly higher percentage of agreement between the teams on the codings of these two filmed sequences. This suggests that the timing factor for the other films was definitely a cause for the relatively low percentage of inter-team agreement. A complete analysis of inter-team agreement for the function categories of each filmed sequence is included in Tables 14 and 15 of Appendix G.

On the filmed sequence for Spanish, Grade 3, on the 15-second timed sequence, the agreement between teams for the Function Dimension was 91.1 percent; and for the Social Studies, Elementary, sequence, 76.6 percent. On the 10-second timed interval, the agreement for the Spanish Grade 3 was 85.1 percent and for Social Studies, Elementary 74.4 percent.

These results indicate that when both teams viewed the filmed sequences at the same time, there was a much higher consistency in the agreement of codings of the behaviors as observed at both the 10- and 15-second timed intervals.

Adequacy of the System of Classification

The plan for development of the system of classification had called for the cessation of adequacy testing when crucial additions or deletions to the paradigm and taxonomy were no longer suggested by teacher behaviors that could not be classified. This guide-line was established to eliminate the necessity of setting an arbitrary number of needed observations of classroom situations and also to provide a reasonable limitation to the number of observations needed.

Filmed sequences had been selected initially to provide a realistic range in grade level of students, subject matter areas, and methods of instruction. The criterion of adequacy was to determine if the system of classification was adequate for the purpose of classifying all observable dimensions of teacher behavior in the classroom situation. In other words, it was possible to categorize all behaviors without making additions or deletions to the taxonomy or paradigm.

During the viewing of each filmed sequence, notes were made of unusual encounters or encounters difficult to categorize. An evaluation was made of these instances and of the types of difficulties met in coding. Additions, deletions and modifications were made in the scope of definition of categories following the viewing, coding and discussion of each filmed sequence.

It became obvious early in the study that not all films were equally demanding of either coders or of the system of categories. Since only teacher behavior was classified, categorization was relatively easy when the teacher permitted a large measure of student-directed activity. Since the original system of classification was based on previous studies which placed major emphasis on substantive verbal teaching behaviors, those situations wherein the teacher behavior was predominantly non-verbal or directed toward non-content oriented activities provided the greatest number of instances of behavior not classifiable within the initial instrument. These gaps in the classification system were bridged by adding new categories or by the redefinition of existing ones. As the categories were checked out through additional classroom observations, this procedure made it possible to stop adequacy testing as planned without setting an arbitrary number of needed exposures.

Except for those behaviors which fell mainly into the non-verbal areas of the instrument, behaviors difficult to categorize in the initial codings were due to a lack of understanding by the coders of the definitions for the categories. Greater familiarization with the instrument and discussions between coders and instrument developers removed many of the noted instances from the questionable realm. Nevertheless, unique examples of behaviors difficult to categorize were discovered even on the last day of kinescope viewing and coding. However, they were readily classified within the system of categories when time was allowed for discussion and consideration of the behavior. The forced time interval coding procedure tended to create questions about behaviors which were easily resolved when reconsidered under less pressure.

The Source Dimension as originally developed proved adequate for all situations except those few in which the behavior of the teacher was ambiguous or multi-functional. For example, the teacher would RESPOND to a student's question and then continue in his spoken response to pursue a topic which related to the question but may have been preplanned. In such instances, an evaluation of the teacher's behavior within the framework of the whole class session was necessary in order to determine the point at which RESPOND became ORIGINATE. Usually the RESPOND category was maintained until an obvious change in encounter occurred. At such a time the Source Dimension was again categorized in terms of the new encounter.

A second type of confusion resulted from the use of timed observations when the teacher exhibited more than one sign and/or function. For example, he would nod yes in response to an answer from a student while proceeding to ask another question. The nod was RESPOND,

GESTURE, **REGULATE**, Support while the question was **ORIGINATE**, **SPEAK**, **DEVELOP**, Elicit or Check (depending on the question). The timed categorization did not permit the hairline distinctions necessary in these situations and thus, caused difficulty for coders. However, the instances were readily recognized encounters and did not necessitate the provision of additional distinctions within the Source Dimension. The inadequacy was in the procedures, not the system of classification.

The two categories within the Source Dimension proved adequate for purposes of classifying teacher behavior only. A third distinction could have been made in terms of response to other than student or other than human stimulation. Expansion of the system of classification to encompass student behaviors will undoubtedly make this distinction necessary. In such a case, the **RESPOND** category will have to include response to students and response to mechanical devices. An example of the latter response would be the teacher stopping the class discussion at the sound of the bell designating the end of a class period.

A major addition to the instrument was the Direction Dimension. This was necessary upon completion of the adequacy testing. When the instrument was compared with the paradigm designed to include the critical observable factors at work in the behavior of the teacher in the classroom, direction was found to be lacking. The four categories developed for inclusion within the Direction Dimension were evolved from the logical organization of the patterns of encounters which had been observed. It may be that further observation of other classroom situations will reveal the need for additional categories within this dimension, but an analysis of the data already coolected indicated that the four categories, **INDIVIDUAL**, **GROUP**, **CLASS** and **OBJECT**, were adequate.

The Sign Dimension was expand.d to include the READ category after the pilot study. Combined with the SPEAK category it was believed to cover all (oral) verbal behaviors. However, several instances of laughter on the part of the teacher necessitated the re-evaluation of this premise. While a separate category to cover this type of behavior might have been added, it was felt that little would be gained by it. Further, it would make the system of classification longer without making a significant distinction between behaviors. The alternative was to include laughter within an existing category. The example provided by the filmed sequences indicated a greater resemblance of laughter to a smile, coded under GESTURE than to either SPEAK or READ, the other two oral modes of communication. Such problems are typical of the intricate relationships to be noted in personal behaviors. Besides being physiologically similar, the Function Dimension proves about equally enigmatic in the case of laugh and smile.

By far the most instances of behaviors found difficult to categorize fell within the Function Dimension. This was expected for two reasons: (1) This dimension required a greater interpretation on the part of the observer and (2) the addition of sub-categories of each major category increased the complexity of decision making. The major categories appeared to have been well defined, for no examples of extra-categorical behavior were recorded. However, the difficulties in coding arose over deciding which sub-category described a specific behavior.

One of the first behaviors noted in observation that had not been included in the instrument at the time of the pilot study was the teacher walking around the room observing students while they worked individually, in small groups, or as a class under the direction of a student or student teacher. While the behavior was immediately classified within the ADMINISTER category of the Function Dimension, neither Manipulate nor Manage Materiel provided a satisfactory description of the behavior. Therefore, the Proctor sub-category was developed to cover this type of behavior. It was purely by chance that this kind of behavior appeared in one of the first filmed sequences. Several films provided no instances of Proctor in teacher behavior. It was just such a possibility which dictated the reviewing of all films before selection and the selection of filmed sequences on the basis of as great a variety of subject matter, age level, and teaching techniques as possible.

Similarly, the Routinize sub-category under the ADMINISTER category was found to be necessary. The pilot study had provided evidence for the necessity of a sub-category in ADMINISTER to cover the non-personal and non-content directed behaviors of the teacher. Because these behaviors are most predominant at the beginning and end of a school period, the filmed sequences provided little evidence of such behaviors and it was not until the final analysis of the data, and the review of the specimen records of behaviors difficult to categorize, that this gap in the instrument was discovered to be critical at the sub-category level.

The isolated instances of behaviors difficult to categorize in the Function Dimension totaled 25 for all filmed sequences. Since there was a total of 25 kinescopes, and as many as five problem instances noted in one film, it is obvious that several films presented no special difficulties in coding. An analysis of these 25 instances indicated that they were distributed about equally over the three-month period of testing and between the two coding teams. In only one case was the same behavior noted by all four observers as impossible to classify. This was a unique instance in terms of normal classroom behavior because the teacher was clearly informing, but he was addressing his behavior to observers in the classroom. In other words, he had a dual teaching function: first, he was teaching his regular class; second, he was using his class for demonstration purposes to teach a group of college students. Because this was an atypical classroom behavior, it was handled by use of a special symbol (an X on Form A and a square on Form B) to denote informing behavior not directed to the regular students of his class.

The system of classification was deemed to be adequate when all behaviors from a wide range of different subject matters, teaching techniques and grade levels could be classified, and on the basis of the sufficiency of the categories to account for those behaviors included in the paradigm.

An additional check of the adequacy of the instrument was provided by one filmed sequence in which the teacher endeavored to show two different types of teaching. The teacher behavior in the first episode was purported to be negative in approach and that of the second episode was to be positive. While the subjective evaluation of the teacher's behavior by all four observers agreed that both episodes evidenced strong negative behavior patterns, even when the teacher attempted to be positive, the coding of the behavior by both teams on all forms provided considerable evidence of a difference in the two types of behavior.

The same lesson was taught to two different groups of children. An analysis of the codings of the observation made on Form B by both teams revealed that the negative approach (which was given first) provided a composite score of 18 instances of restrictive behavior and 28 instances of eliciting behavior. The episode designated "positive teaching" provided a composite score on Form B of 17 supportive behaviors, seven restrictive behaviors and 51 eliciting behaviors. Interestingly, the "negative" teaching evidenced less manipulative behavior than the "positive" teaching. Table 10 shows a complete breakdown of frequency of behaviors as coded during the untimed observation. Both episodes lasted the same length of time.

The fact that the instrument shows a difference in actual behavior even though the subjective feelings of the observers while coding was contrary to what they expected, indicates that the system of classification is adequate for distinguishing different behaviors. This differentiation of behavior is evidence that the system may be used for collecting specific information and to guide the interpretation of data provided that a rationale, frame of reference, or value system is developed to guide the reorganization of the existing categories and sub-categories into new composite rubrics.

The type of substitutions made between categories within each teacher behavior dimension provided a final adequacy check on the instrument. The Source Dimension, with only two categories, did not permit substitutions. The types of problems involved in categorization within this dimension have been discussed previously. No substitutions were made within the Sign Dimension after the first few observations and coding experiences. Initial confusion was evidenced by the substitution of GESTURE for PERFORM and PERFORM for WRITE. These were found to be associated with behaviors of mathematics and science teachers who drew mathematical symbols on the chalkboard. Since it involved the use of

Table 10

A Comparison of Two Types of Teaching by Frequency of Occurrence of Spoken Teaching Behaviors

	Negative Teaching Instances	% of Total	Positive Teaching Instances	% of Total
STRUCTURE	5	4.5	5	2.9
Initiate	2	1.8	2	1.2
Order	3	2.7	3	1.7
Assign	0	0.0	0	0.0
DEVELOP	39	34.8	74	43.0
Elicit	28	25.0	51	29.7
Check	2	1.8	4	2.3
Inform	0	0.0	4	2.3
Explain	0	0.0	0	0.0
Summarize	0	0.0	0	0.0
Reinforce	8	7.1	15	8.7
Stimulate	0	0.0	0	0.0
Test	1	0.9	0	0.0
EVALUATE	9	8.0	11	6.4
Appraise	0	0.0	0	0.0
Opine	2	1.8	0	0.0
Stereotype	7	6.2	11	6.4
REGULATE	41	36.6	45	26.2
Set Standard	17	15.2	17	9.9
Support	2	1.8	17	9.9
Restrict	18	16.1	6	3.5
Inquire	1	0.9	1	0.6
Assist	0	0.0	1	0.6
Monitor-Self	3	2.7	3	1.7
ADMINISTER	18	16.1	37	21.5
Manipulate	18	16.1	37	21.5
Manage Materiel	0	0.0	0	0.0
Proctor	0	0.0	0	0.0
Total Instances	112	100.0	172	100.0

writing implements some observers automatically coded it **WRITE**. Likewise, conducting experiments in science involved movement of the body and appendages. Initially, such movement was coded **GESTURE** instead of **PERFORM**. Observations made after the definitions of these categories had been sharpened and clarified did not provide examples of substitutions within the Sign Dimension.

After the adequacy of the descriptive dimensions of teacher behavior and the sufficiency of the gross categories within the Function Dimension had been established, tabulation of substitutions in classification of behaviors in categories and sub-categories in the Function Dimension still revealed areas of weaknesses requiring further attention and refinement in the system of classification. These weaknesses indicate some inadequacies in establishing the limits of categories within the Function Dimension and more particularly weaknesses in establishing the sub-categories within the major categories of this dimension.

However, a high degree of adequacy existed within the Function Dimension. Tables 16 and 17 in Appendix G present a summary of the total adequacy estimates for the Function Dimension using data from the kinescopes.

The degree of adequacy was determined by use of the formula $D_A = Ti - \frac{\frac{S_x + S_y}{2}}{Ti}$. Ti equals the total instances of categorization for a given time interval within the Function Dimension. S equals the number of instances of substitution of one category for another category within the Function Dimension. Since the total instances of categorization is based on a count of substitutions, omissions, and agreements within each category, each substitution was counted twice in the raw data. Using Team I as the basis for determination, all of the codings of Team I were counted together with those codings of Team II which are in disagreement with Team I. Therefore, it is necessary to divide the total substitutions in half to determine the actual instances of coding. Total instances of categorization (Ti) is not to be confused with total possible instances of categorization (T_p) which was used as a base for determining the reliability of the observation coded (see p. 106).

Of the 2,654 possible categorizations in the Function Dimension made at the 10-second interval, there were 443 instances of substitutions of sub-categories in coding made by one team when compared with the codings made by the second team. Ignoring the procedural difficulties involved in synchronization of the timing of the observations, it is seen that the adequacy estimate of the instrument is 83.3 percent. In only 16.7 percent of the encounters observed was there any disagreement in coding. When these results from all sequences of teaching are compared with the results of the two instances in which the time factor was controlled, a more specific picture of the adequacy of the instrument is apparent. Spanish, Grade 3, reveals an adequacy percent of 100.0; the Social Studies, Elementary, an adequacy percent of 94.2. In both cases the percentage of adequacy is considerably higher than in those cases in which separate viewings took place, with the exception of Biology, Grade 10 and Physics, Grade 12. The two sequences were viewed separately, but with special care being taken to achieve maximum synchronization by one member of Team II observing the activity of Team I while they were coding. A complete analysis of agreements and disagreements by filmed sequence is given in Tables 18 and 19 of Appendix G.

Of 1,779 possible categorizations made at the 15-second interval, 389 substitutions of one sub-category for another were made by one or the other of the two teams. An adequacy percentage of 78.1 results. Again, a comparison of this figure with those of the two simultaneous observations supports the conclusion that lack of synchronization in viewing prejudiced the test of adequacy. Spanish, Grade 3, at 15 seconds resulted in 99.0 percent, and Social Studies, Elementary, in 93.1 percent. As in the case of the 10-second simultaneous observations, these adequacy percentages are significantly higher than those obtained for observations conducted at separate viewings.

On this basis the overall adequacy was considered to be sufficient at the category level of the Function Dimension.

An analysis of the special difficulties involved in those observations in which the adequacy estimate fell below 75 percent is included in the next section.

Analysis of Timed and Untimed Procedures

The original proposal anticipated the development of an instrument which would permit the observation and categorization of all observed behaviors of a teacher in a classroom. Initial attempts to realize this expectation operationally were difficult in live classroom observation because of the large number of categories in the system. In order to overcome this problem "selected" observations at set intervals were made under the assumptions that (1) further familiarity with and development of the instrument would permit observation and categorization of all observed behaviors; and (2) over a period of time using various timed intervals it would be possible to observe and categorize all behaviors. This open approach to data collection was permissible because the objective was to discover all the behaviors possible without concern for the particular patterns or sequence of behaviors.

Initially, timed intervals of 5 seconds, 10 seconds, and 15 seconds were attempted. The 5-second interval was found to be too short for adequate coding of observed teacher behaviors because of the complexity of the system. The 10- and 15-second interval timings were found to be operational for coding purposes and were used in the adequacy testing. The frequency of categorization was established at 10- and 15-second intervals in order to quantify the results of the observations and classifications for comparison purposes.

These timings were functional for recording teacher behaviors characterized by slow changes in behavior. However, in instances of rapidly changing behaviors, even the 10- and 15-second timings were sometimes difficult. A smaller unit of timing would seem desirable for these rapid changing behaviors; however, making the timing intervals smaller would have made it impossible to keep up with the recording on a timed basis. Looking at the film and making the notations on the coding sheet took several seconds. If timings had been closer together, the period spent in viewing would have had to be decreased and greater dependence would have been placed on the audio stimuli for recording rather than a combination of audio and visual stimuli.

In order to have available an oral indication of the time interval, numbers were placed on audio tape and synchronized with the viewing of the filmed sequence of teaching. Since the coding sheets for the instrument had space for recording 30 instances of behavior, the numbering on the tape was done in groups of 30. For the 15-second timing interval, three sets of 30 were recorded in the following way:

The word "start" was used to begin the film for recording. Numbers from one to 20 were recorded normally; numbers from 21 to 30 were recorded by saying "one," "two," "three," . . . "nine," "thirty" in order to keep the time required in saying the numbers approximately equal. This was done for each of the three sets of numbers. Four sets of numbers were recorded for the 10-second interval timing in the same manner.

All filmed sequences had titles. As soon as the titles faded, the tape recorder was started. The first coding was done at the c[illegible] of "one." Hearing the number provided the stimulus for beginning the coding of the teacher behavior being observed on the kinescope.

In the beginning, because of lack of familiarity with the process, it was necessary for the teams to stop the filmed sequence at the end of the first 30 timed intervals. This resulted in some differences between teams because an undetermined number of frames passed through the movie projector between the hearing of the number "thirty" and the stopping of the film movement. Through continued use, it was possible to record at the 15-second interval for 22.5 minutes without stopping, and for 20 minutes at the 10-second interval, except for filmed sequences which provided examples of rapid and frequent changes in behavior.

The stopping and starting of the movie projector gave some difficulty in the exact timing done by the teams. If one team stopped at the end of the first set of 30 and the other team did not, a difference in the sequences coded resulted. For example, if Team I stopped the movie projector at the end of the first 30 instances of time and the other team did not, some difference resulted in the encounters observed in the second set of 30 instances. The team which stopped the projector lost a few frames in the process of turning the machine on and off. Furthermore, the sound was distorted for the first few frames each time the projector was started again.

If the tape with the numbered sequences were rewound by the team who stopped at the end of the first set of 30 intervals, the timing for the second and remaining sequences was different because of incidental differences in the timing on the taped numbered sequences. This did not result in a major difference of codings since the numbers recorded in each set were based on carefully timed intervals. Nevertheless, the stimuli for the coding was not always identical for both teams if one were listening to the first set and the other to the second set of numbers. Differences in the speed of pronunciation of a given number as well as fractional differences in intervals between numbers were inevitable.

The tape recorder was started as soon as the titles faded from the screen. At times it was difficult to begin the tape at the same time in succeeding viewings because the title faded gradually. Such a beginning resulted in a difference in the number of intervals recorded by the two teams. If one team started a few seconds before the other, the recordings could not be compared on the basis of the same teacher behavior. This resulted in a timing difference between teams.

The numbers recorded were stimuli for the coding of teacher behavior. As soon as the number was heard, the observer of each team had the responsibility of making a decision as to what to record. Recording the observed behavior after hearing the number caused differences in the coding of instances when the change of behavior was rapid and frequent. For example, if the timed interval appeared in the middle of a question, it was somewhat difficult to decide what to code: "John, what is the answer to the question?" If the calling of the number occurred after "John," and then immediately continued with the question, the observer had a choice of coding the function as Manipulate or Set Standard. If the teacher had said, "John," paused, and then continued the question, and the timed interval had occurred during the pause, the behavior would have been coded as SILENCE. If the entire question had been rapid, the observer may have coded both the Manipulate and Set Standard or only one function. This decision was the observer's, and led to confusion in coding at times.

At times, the behavior changed so rapidly and frequently, that there was confusion as to what to record. Split-second change in behavior at the interval also caused some difficulty. Even though the 15- and 10-second timing intervals were chosen for the study, the timing was still relevant. The hearing of the number on the tape was the stimulus for recording the behavior observed. When hearing the number, the observer then had to decide what to code. In a situation where the teacher said, "The reason for the loss at the Battle of the Alamo ("five") . . ." the coding was difficult because there was lack of information as to the real function of the statement. Coding the behavior at a particular moment, such as the above, was not always exact. The situation could have been followed by completing the statement with a question, or continuing to Inform or Explain. Because of the timed interval, the observers were forced to code a particular function. In addition, the observer had to make a decision to code the behavior happening at the instance of the hearing of the number, consider the happenings just before the call, or wait a few seconds after the call to record the coding.

Some teacher behaviors lasted longer than others. In instances where the behavior was of an extended duration, the agreement between teams was higher than where behaviors were rapid and changing. Sometimes a teacher started to initiate an activity, and then after codings at several intervals in this category, interrupted this type behavior with another kind of behavior and then returned to the initiating behavior. In recording the teacher behavior at the 15- and 10-second intervals it was difficult to distinguish between the overall classification to make and the exact behavior of the teacher as seen and heard at a particular time. Previewing the filmed sequences helped to give the observers better understanding of the function of the behaviors of the teacher, but it was difficult, at times, to maintain and recall the complete thought while coding. The broader classifications of function had to be uppermost in the minds of the observers for recording behaviors, and then each of the sub-categories of function had to be determined for a particular teacher behavior.

At the 10- and 15-second call made between numbers recorded on the tape recorder, all three dimensions were recorded on the coding sheets. In some instances, only the source and sign had to be marked, such as **ORIGINATE** and **SILENCE**. In other instances, several behaviors were recorded. The source usually had only one mark for an instance. A few instances of rapid teacher behavior change resulted in coding both **ORIGINATE** and **RESPOND**. The sign dimensions, however, could have more than one coding for an instance. For example, the teacher could have been writing on the chalkboard and speaking at the same time or performing and speaking at the same time. These multiple behaviors usually necessitated recording at least two function categorizations--Informing, or Explaining and Managing Materiel, or Assisting and Informing. This meant that the observer had to make a decision on at least five codings at the hearing of the number from the tape recorder. In a few instances, more than five markings were made for a particular instance because of added meaning of the behavior of the teacher.

On Form B, which was untimed, recording all behaviors of the teacher created certain problems. It was most difficult to record all behaviors of the teacher when the behaviors were rapid and changing frequently. The observers had to look at the instrument for coding and in this small period of time, a behavior might have been missed. During the early part of the recording phase, it was necessary to stop the movie projector frequently to record all behaviors which were observed. This resulted in a few frames of the film being lost because of the movement of the film through the machine and the distortion of the sound when the projector was started again. After continued working with the system of classification, longer periods of observing were possible. For filmed sequences of slow changing behaviors it was possible to view the entire sequence without turning off the machine. In filmed sequences of rapid and frequently changing behaviors, continuous viewing was not always possible. Because the numbers used for recording the behaviors were in sequence, it was sometimes difficult to remember which number had been last recorded and hard to compare the results of team members. However, after viewing each filmed sequence, the members of each team compared codings and corrected the number sequence. The numbers could not be used for comparing one team with another because of the difference in sequences seen and because of the difference in times changed from one sheet to another. Therefore, the numbers per se were not used as a basis for comparison.

Analysis of Disagreements in Coding

While endeavoring to establish the adequacy of the system of classification, disagreements of three types were noted--omissions of classification of some behaviors by one or the other of the teams of coders; selection of different portions of encounters for categorization; and the substitution of one category or sub-category for another category or sub-category.

Sign Dimension Disagreements.--Omissions of categorization were noted in the Sign Dimension in those encounters wherein several behaviors were present at the same time. This was particularly noticeable in the mathematics and science classes in which the teacher was using the blackboard and other equipment during the lesson.

Because of the pressure of time, and the requirement that a gesture have a discernible function, until facility had been gained in handling the instrument, there was a tendency to occasionally code a gesture immediately upon noticing it and then not be certain it had a function. Such cases accounted for the isolated instances of GESTURE omissions.

Closely related to this type of omission were those which occurred because the observer was in the process of looking at his coding sheet to make an entry when a gesture or performance of short duration occurred. This type disagreement was less frequent, however. An adjustment was made in the scoring to count as "agreement" those instances where three of the four agreed on a PERFORM or GESTURE behavior and the fourth observer failed to note it.

Of the 474 instances of disagreement within the Sign Dimension at 10 seconds, 388, or 81.9 percent were omissions by one team or the other. Of these omissions, 23.5 percent were in the SPEAK category, 0.5 percent in the READ category, and 13.3 percent in the WRITE category. The vast majority were in the GESTURE and PERFORM categories. Furthermore, the substitution of one category for another was predominantly between GESTURE and PERFORM. Substitutions between these categories made up 57.0 percent of all substitutions, and 8.0 percent of all disagreements in coding of the Sign Dimension during 10-second observations.

On the 15-second observations, there were 350 disagreements within the Sign Dimension; 81.1 percent were omissions by one team or the other. The SPEAK category accounted for 21.8 percent of the omissions; READ, .4 percent; and WRITE, 11.6 percent. As in the case of the 10-second observations, substitutions between GESTURE and PERFORM were most high. They comprised the largest group of the total substitutions, except for substitutions of SPEAK for READ. Fifteen of the total of 66 substitutions were made between these categories in two observations only. In both of these cases the teacher was not always visible even though her voice could be heard. Clarification of procedures to permit the inference of a continuation of the same Sign Dimension through an encounter when the camera moved from the teacher while she continued to speak removed this problem.

It did not occur on subsequent observations.

A breakdown of the number and percentage of disagreements at 10 and 15 seconds by category for the Sign Dimension is included in Tables 20 and 21 in Appendix G.

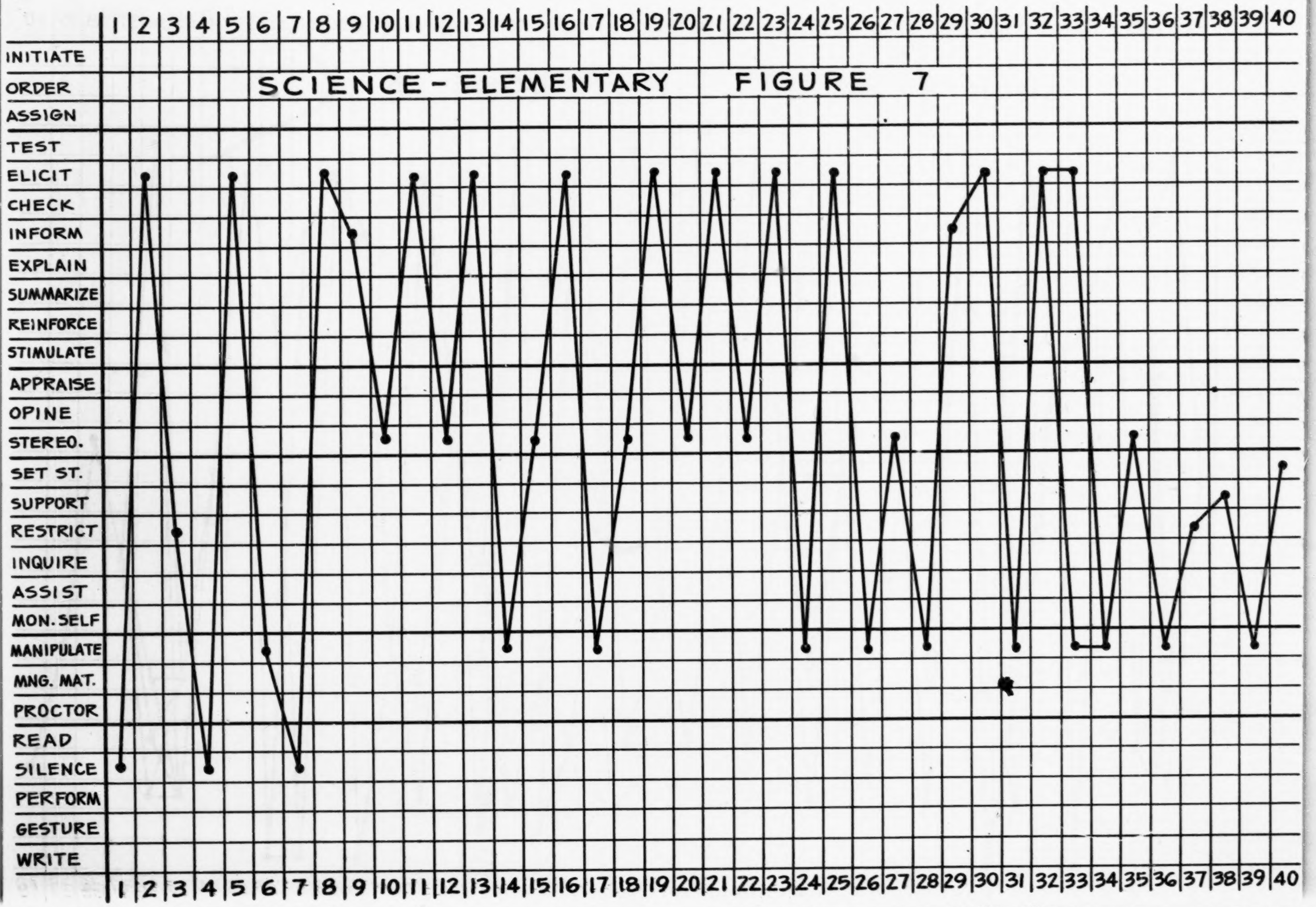
As noted in Chapter IV, instances of substitution of SILENCE by one team for any other Sign Dimension were disregarded in the quantification of the reliability and adequacy indeces. These cases were found to be obvious manifestations of selection of different encounters for coding. Of 3,889 instances of coding at the 10-second interval, 541 substitutions were recorded. In the 15-second observation, 447 instances of different encounters coded were recorded out of a total of 2,903 instances. The causes of this type difference are discussed under the Analysis of Timed and Untimed Procedures.

The use of Form B for continuous observation and classification of behavior overcame the problem of classifying different encounters, but it did not entirely solve the problem of omission of secondary Sign Dimension behaviors. The observers tended to concentrate on the oral behavior as primary, even though the system of classification was designed to minimize this tendency. If anything were omitted, it was GESTURE, PERFORM, or WRITE when accompanied by spoken behavior. The frequency of omissions for the Sign Dimension was much less on the untimed than on timed observations.

When the teacher was very active and used constantly changing patterns of behavior, it was sometimes difficult to maintain the dual or triple entries made necessary by the behavior. The nature of the difficulties related to the speed of teacher behavior, frequency of change in encounter and behavior pattern, and complexity of behavior pattern may be seen by reference to Figures 7 and 8. Figure 7 gives an example of a simple behavior pattern. Figure 8 is an example of a complex pattern. The complex patterns are difficult to code, difficult to transcribe in a profile and difficult to interpret.

Figure 7, the profile of an elementary science teacher at the beginning of a class period, is an example of a very simple, linear behavior. In interpreting this figure, all behaviors in the Function Dimension sub-category may be accepted as being coincidental with spoken behavior of the Sign Dimension unless the behavior is coded below the double line in an alternate sign category. At encounter one, the teacher was silent; at encounter 2, the teacher performed eliciting behavior; at 3, she restricted; at 4 she was silent; at 5, she elicited; at 6, manipulated, and so on. All behaviors in this profile of behaviors were sequential and none were simultaneous.

A very different pattern is seen in Figure 8. The shorthand teacher begins the class by setting the standard for future student behavior and then at the second encounter gives a test while manipulating the classroom environment and managing materiel. She both speaks and performs while serving these functions. At encounter 3, she goes to a linear behavior, reading being the mode of communication and informing being the function. At encounter 4, she speaks and elicits; at 5, she writes on the board and reinforces what she has said previously; at 6, she stimulates the class by speaking in preparation for the next testing situation. At the 7th encounter she again tests orally while performing some other activity and manipulating the classroom environment. At encounter 8 she no longer manipulates the environment, but writes on the blackboard, serving to manage the materiels she has selected to use



SCIENCE - ELEMENTARY FIGURE 7

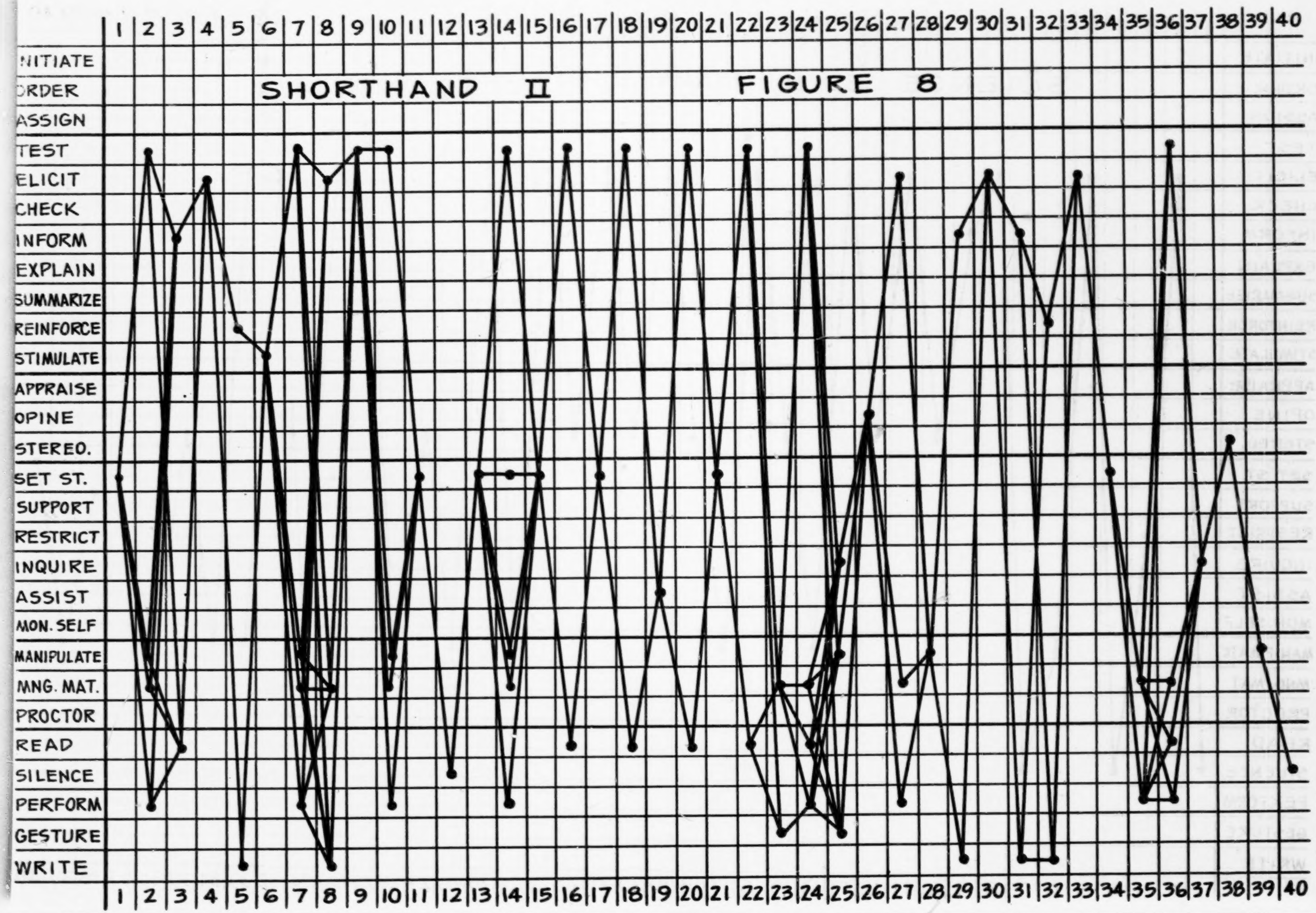

SHORTHAND II

FIGURE 8

in eliciting a response. (While the profile does not record the exact nature of the situation, the observers noted that the PERFORM-Manage Materiel category was limited to handling a stop-watch to time dictation exercises which formed the test material.)

Because laughter was infrequent, it was decided not to further complicate the instrument by adding a LAUGH category to the Sign Dimension. However, laughter was made a part of the system of classification and was handled during observation and coding by placing an "L" in the GESTURE category.

Reviewing the films made it possible to pick up initial omissions caused by too rapid sequence or multiple combinations of the Sign and Function Dimensions. The combination of the results of observations made on the two forms (A and B), confirmed the adequacy of the system for categorizing all Sign Dimension aspects of teacher behaviors.

Function Dimension Disagreements.--Instances of difficulty in classification within the Function Dimension were found to be of three types similar to those found in the Sign Dimension, but with special causes more directly related to minor inadequacies in the present system.

The total adequacy estimate as presented on pp. 112-123 of this chapter is of little consequence in determining the final adequacy of the classification system because the system was being modified and extended throughout the testing. A better estimate is gained from an analysis of the results of the individual observations and the types of substitutions that occurred in them. Tables 16 and 17 in Appendix G. provide a breakdown of the adequacy estimate of the instrument for each filmed sequence for both 10- and 15-second observations.

Five of the 19 observations made at 10-second intervals, and nine of the 20 observations made at 15-second intervals for the Function Dimension fell below 75 percent in degree of adequacy. This indicates that fewer substitutions were made on the observations at 10 seconds than on those at 15 seconds. The lower number of substitutions on the 10-second observations was partially due to greater familiarity with the filmed sequences since most observations were made at the 15-second timed interval first. In five cases, the degree of adequacy was greater on the 15-second observation than on the 10-second observation for the same filmed sequences. In only two instances was the difference greater than two percent. In both of these instances one or both of the teams categorized the behavior at 10 seconds before 15 seconds. This indicates that there was a direct relationship between frequency and sequence of viewing and adequacy of observer categorization. The switch in the usual sequence of observation resulted from previewing the films which enabled the observers to know that the categorization of these particular films would not be difficult. This judgment was based primarily on low incidence of teacher participation in the class activity.

Special Problems with Three Films.--The lowest degree of adequacy was achieved with English, Grade 12, a class called Creative English. Three unique factors would seem to have contributed to the low degree of adequacy computed for both the 10- and 15-second observations. First, the sound reproduction of the film made it difficult to understand at many points and the observers disagreed as to what was being said even after repeated observations. Second, the class was unstructured, thus making it difficult to discern the function of some of the encounters while in the process of coding. Third, the teacher's behavior was often ambiguous because she played a consultative role in much of this sequence. As she moved from small group to small group working as committees, she changed from a participant in the discussions to a controller of the discussions and back again. This led to considerable confusion among observers as they attempted to discern the specific function of the behaviors. It was noted that a similar confusion seemed evident on the part of the students as they tried to shift their behavior to meet the shifts in the teacher's behavior.

On the basis of a composite score of adequacy arrived at by adding the percentages of adequacy for both the 10- and 15-second observations, the range of adequacy was found to be 118.8 to 199.0. Table 22 in Appendix G provides a complete list of composite scores by filmed sequences. In the case of one film only, did the composite score fall below 60 percent. This film was of English, Grade 12. The distribution by percentage of adequacy is given in Table 11.

Table 11

Distribution of Composite Adequacy Percentages

Percentile	Frequency of Occurrence
90th	3
80th	7
70th	5
60th	3
50th	1

Besides the Creative English sequence, a class in Physical Education for mentally retarded children and a ninth grade Social

Studies class provided the greatest number of instances of substitution of categories within the Function Dimension. The Physical Education film caused confusion for the observers because the teacher was filling two roles--instructor of a junior high class in Physical Education and instructor of college students preparing to teach. When he functioned in the role of informer to the college student viewers, the coding was in unanimous agreement. But when he directed his behavior to the junior high students, the coders could not agree whether he was developing a skill, regulating the students' behavior or merely maneuvering the students through a routine which he had developed before. Each team of observers consistently coded the particular behavior in a given category, but they coded the specific function differently. In this case, the problem could only be resolved by knowing what had gone before the situation presented in the filmed sequence. If the students had learned the specific skills before but their recall of the steps needed to be jogged, the teacher's behavior in giving instructions for performing a roll, somersault, or head-stand could logically be coded Reinforce. If the same teacher behavior were viewed as merely a command to perform a physical feat as the class had been trained, it would be manipulative. The same behavior could be coded Set Standard if the purpose were seen to be regulative of student behavior. Since there was insufficient information about the antecedent class activity, the difficulties of coding could not be resolved and the system of classification had to be judged of questionable adequacy for cases in which the purpose of the teacher behavior was not clear.

The third filmed sequence which provided evidence of inadequacies within the Function Dimension was a ninth-grade Social Studies class. On both the 10- and 15-second observations the coders substituted structuring behaviors for developing behaviors. Over 25 percent of the total substitutions were in these categories. This problem was the result of difficulty in the establishment of the priority of the category over the sub-category. Because of the design of the Form A coding sheets (see Appendix F) observers tended to look at small segments of behavior rather than a total encounter. Thus, two specific problems arose. First, the observers failed to maintain the major category distinction. After observation of the ninth-grade Social Studies class, one of the first of those conducted during the validation study, it was discovered that one of the teams was not coding in terms of the prevailing purpose of the behavior. When the teacher asked questions or supplied information at the beginning of the class in an effort to set the context and order of future work, it was coded as developmental behavior with an eliciting and informing function respectively, rather than as Initiate and Order. A similar confusion was noted in the use of the DEVELOP and REGULATE categories and DEVELOP and EVALUATE categories. The sub-categories Elicit and Inform were misinterpreted to be the same as questioning and making a statement. Therefore, when a regulative or evaluative behavior occurred in the form of a question, it was coded Elicit under DEVELOP. Likewise, a statement containing information, even if not related to the development of the content or procedures was often coded Inform under the DEVELOP category.

Difficulties with Isolated Behaviors.--Another specific problem was related to categorization of behaviors which seemed to interrupt the overall pattern set by the teacher. This type difficulty was particularly prevalent in the initial coding because of minimal familiarity with the instrument on the part of the observers. But it proved to be a continuing temptation on the timed-interval coding. The most prevalent disagreements in coding of this nature were the coding of specific behaviors as developmental behavior during a structuring encounter. This was especially true of those sub-categories of behavior, Explain and Inform, and to a small degree Elicit and Check. However, the bulk of such substitutions occurred during the first half of the observation testing. After the fifth coding session, substitutions between the **STRUCTURE** and **DEVELOP** categories became insignificant, amounting to no more than three substitutions between these categories on any single filmed sequence.

The tendency to confuse categories in this manner appeared to be related to the degree of orderliness or structure imposed on a situation by the teacher. When a behavior demonstrated what was judged to be considerable planning because of its orderliness and predicability, it seemed easier to follow the pattern of the teacher and coding remained consistent from observation to observation by each coder, each team and for both teams. When a pattern was less obvious or difficult to discern, the temptation was to scatter the categorization. This type of ambiguity was occasionally cleared up after the entire sequence had been viewed several times. However, since corrections of earlier categorizations could not be made with any degree of surety, the first impressions were allowed to stand in the data used in this study and no adjustments were made in codings between teams. It was sufficient to know that the causes of substitutions and omissions during coding could be checked against subsequent observations and classifications. The inability of the observers to see certain behaviors, whether based on a time differential or misunderstanding of the categories, in no way affected the adequacy of the system of classification to enable recording of all behaviors.

A second type of problem with isolated instances was more difficult to overcome and persisted to the last day of viewing. In these instances a particular behavior did not seem to have a clear function. The purpose of the teacher was not clear. A spot check of such encounters indicated that while not all observers made special note of the same instances, when one observer was uncertain about the behavior and made a note of it, the other observers frequently differed with each other and tended to change their coding of the behavior from observation to observation. From discussion of such encounters by the coders, the primary cause of confusion in coding such behaviors is hypothesized to be the inherent ambiguity of the encounter caused by uncertainty as to the teacher's purpose. Not only were the observers uncertain about what they saw in terms of the Function Dimension, in the same situation the students evidenced similar insecurity. Such instances are examples of the strength of the instrument rather than its weakness. However, it is impossible at this stage in development of the instrument to validate this point with a high degree of certainty. Further investigation is necessary.

A third type of confusion which was noted in isolated instances related to the problem of maintaining the primary category concept rather than the sub-category concept. However, its root was the reverse of the difficulty discussed above. Where the first problem was corrected by clarifying observer understanding of the priority of the established category over the sub-category, this problem was intensified by a strict adherence to a primary premise of the system of classification, namely, that sub-categories are parallel units of categories. The Stimulate sub-category provided the primary example of this difficulty and pointed to an inadequacy in the system. The sub-category proved ambiguous because of its inclusion in the DEVELOP category. Those encounters which were clearly developmental and focused on the content of the course or process caused no difficulty. However, much of the behavior which was ultimately categorized as Stimulate was more directly related to the REGULATE category as a complement to the Inquiry sub-category because it fostered personal or group involvement without regard to particular content or process. This is indicative of the complex nature of the teaching process and teacher behavior, but also emphasizes a critical problem. The problem was not satisfactorily resolved during the adequacy testing in terms of ease of coding or logical consistency. However, the incidence of difference in coding remained low. Only 15 instances of substitution of Stimulate for a regulating function (usually of the Set Standard sub-category) were recorded at 10 seconds and only eight at 15 seconds. These instances represented only 3.4 percent and 2.1 percent of the total substitutions respectively. The recognition of this overlap of regulative and developmental functions was sufficient to permit the handling of instances of this type behavior, but it affected the efficiency of the instrument and required that observers make an exception to the supremacy of the category definition to the sub-category in this instance. Such exceptions are not permissible if total adequacy is to be claimed.

A review of the instances of substitution of one category for another in the Function Dimension indicates that the DEVELOP and

REGULATE categories are the areas of greatest substitution. However, when the frequency of substitution is compared to the frequency of coding in a category, it is revealed that the greatest proportion of substitutions was in the EVALUATE category. The percentage of substitution of the EVALUATE category for another category was 74.7 percent of all instances of categorization in that category on 10-second observations and 82.0 percent on 15-second observations. The bulk of these substitutions were to the DEVELOP category, but they formed only a minor portion of total substitutions in the DEVELOP category. This suggests that the smaller number of instances of evaluative behavior as well as the measured effect of incongruence of observations has severely prejudiced this factor. It is impossible to claim a high degree of adequacy for the EVALUATE category on the basis of the timed observations. Tables 23 and 24 in Appendix G provide an analysis of inter-category substitutions.

Analysis of the results of coding for the EVALUATE category on Form B also showed a lack of concurrence in judgment between Teams I and II. Team I coded a total of 226 instances of evaluative behavior on 19 filmed sequences; Team II coded 299 instances of encounters with evaluative behavior. Since Team II consistently coded more behaviors in all categories when using Form B, the 73 instance plurality for Team II may be judged to be consistent with the overall pattern of categorization by each team. The difference in number of instances resulted from frequent stopping of the projector by Team I which, in turn, caused portions of the behaviors to be lost. Behaviors lost in this process had to be behaviors of short duration. Stereotype, the most frequent sub-category observed in the EVALUATE category, is such a short-duration behavior that analysis of the results of coding proved it to be particularly vulnerable to this procedural fault.

On the basis of the similarity of patterns between Teams I and II when using Form B (continuous observation), and the lack of specific observer questions about behaviors related to evaluation, the system of classification for this category must be judged adequate for the types of teacher behavior observed. But the adequacy of the procedures for timed-interval observations may be challenged for behaviors of short duration.

Intra-Category Substitutions.--Thus far the discussion of substitutions related to the Function Dimension has been concerned with those occurring between categories (inter) of the dimension. A final area of concern was the degree of adequacy achieved for the sub-categories within each Function Dimension category.

On the 15-second observations there was a total of 255 intra-category substitutions; on the 10-second observations, 340. Substitutions were distributed unevenly among the categories. The EVALUATE and ADMINISTER categories each contained 4.1 percent of the total at 15 seconds. The REGULATE category contained 8.5 percent of the total and the STRUCTURE category 9.7 percent of the total on 10-second observations, leaving 73.5 percent of the total substitutions in the DEVELOP category. A similar distribution of substitutions was found in the coding of the 15-second observations. The DEVELOP category accounted for 86.3 percent of the total substitutions and REGULATE and STRUCTURE accounted for only 7.8 percent and 4.3 percent respectively. Table 25 in Appendix G provides a complete picture of the frequency and percentage of intra-category substitutions. The distinctions made between definitions of sub-categories within the ADMINISTER and EVALUATE categories were operational and permitted a near-perfect degree of agreement in coding. The sub-categories within the STRUCTURE and REGULATE categories were only slightly less operational.

Of the substitutions made within the REGULATE category, the major proportion, 90.0 percent at 15 seconds and 79.3 percent at 10 seconds, were related to the Set Standard sub-category. This finding, coupled with the proportionally higher percentage of inter-category substitutions involving this sub-category indicates the need for clarification of the Set Standard definition to make the distinction clearer. However, the frequency of substitutions within this category are insufficient to provide an indication of any specific weakness in the definition. Tables 26 and 27 in Appendix G provide a complete report of the frequency of substitutions for each sub-category of the Function Dimension.

The frequency of intra-category substitutions in the sub-category under DEVELOP indicates that the definitions thus far developed are not definitive enough to allow observers to make all the distinctions in coding of teacher behavior that the instrument developers anticipated. The sub-categories Test, Summarize, and Stimulate showed a low degree of substitutions and thus, may be judged adequate in terms of distinctions within the category.

The remaining five sub-categories within the DEVELOP category demonstrate varying degrees of difficulty in coding. The distinction between Check and Elicit remained difficult for observers to make because teacher questions are often not worded distinctly enough to allow coders to decide whether the question required a synthesis of facts, ideas, and concepts into an answer demonstrating an understanding of the content of the lesson. "Why" and "how" questions were coded with little difficulty. Questions such as, "What would you do in case of a fire?" were less clearly coded. The problem then arose as to whether the coding decision should be based on the type of answer the student gave or on the observer's judgment of the teacher's intent in asking the question based on what had transpired in the classroom situation prior to the teacher behavior being considered. Ideally, in such cases the decision would be made on the basis of the situation, but the pressures of time forced the observers to code the behavior with only a minimum amount of reflection. Specific instruction for observers with examples of this type difficult situation or elaboration of the definition would improve the intra-category adequacy at this point.

The Explain sub-category was sometimes confused with Inform and occasionally with Reinforce. The substitution of explaining behavior for informing behavior or vice versa, parallels the difficulty which arose between Elicit and Check. It was difficult for the observers to decide whether or not the teacher was showing the relationship between facts, ideas, etc., or simply setting forth an array of facts and concepts with incidental mention of relationships existing between them. More instances of substitutions occurred between these sub-categories than between any others. Considerable amplification of the definitions of these sub-categories is necessary.

The cause of substitution of explaining for reinforcing behavior was more easily recognized. Insufficient evidence or attention to the evidence of prior development of the idea, approach, or method caused one or more of the coders to code a behavior Explain when it was confirming or sustaining an idea already explained.

Reinforcing behaviors were confused with informing behaviors for the same reasons stated above for explaining behaviors. The confusions of Elicit and Reinforce were of a different type, however. Observers tended to persist in equating eliciting behavior with all teacher questions. Therefore, rhetorical questions which were one type of reinforcing behavior were sometimes coded Elicit by some observers.

The substitutions of the Elicit sub-category for Inform exhibited the same underlying problem as the Elicit-Reinforce substitutions. Attention to the specific function rather than the grammatical form of the utterance should reduce the number of substitutions in these two sub-categories.

In summary, the intra-category substitutions in the DEVELOP category were of three types: (1) those caused by coder difficulty in maintaining the fine distinction between sub-categories--Check-Elicit, Explain-Inform; (2) those caused by confusion of definitions of sub-categories with prior conceptions of sub-category meaning--Elicit-Reinforce; Elicit-Inform; and (3) those caused by insufficient grasp of the total teaching situation--Reinforce-Explain and Reinforce-Inform. Sharpening the definitions of the five sub-functions involved, providing additional examples of difficult situations, and increasing the emphasis on these areas during training of observers decreased the frequency of substitutions significantly.

CHAPTER VII

CONCLUDING OBSERVATIONS

Some concluding observations are in order. As conceived originally, the taxonomy was to attempt a synthesis of previous approaches to the description and categorization of teacher classroom behavior. After several attempts to realize this synthesis ended in complete frustration, a compromise approach was undertaken. It should be reiterated that this taxonomy would not have been possible without the contributions of those investigators whose work has been cited in the report. But because previous efforts were consciously designed to study and describe selected facets of the classroom situation, their findings and their variety of viewpoints could not be synthesized into one single system for the classification and analysis of teacher behaviors. Some of the categories, approaches, and conceptualizations developed through these earlier efforts, however, provided essential insights from which the present taxonomy was evolved. Since the process of interaction within the classroom is so complex and the phenomena that comprise teaching so varied, the system of classification encompassed by the taxonomy are, of necessity, still limited to the gross and middle-range levels of teacher behavior. Despite this fact, in its present stage of development, the taxonomy provides a means for the empirical description of levels of behavior and furnishes a conceptual screen through which teacher behaviors may be viewed.

An analysis of the results of the validation study indicates the need for further extension and refinement of both the system of classification and the procedures for using the instruments. Several problems encountered in the study require further investigation.

System of Classification.--A major step forward in the system of classification used in the validation study was the addition of the Direction Dimension which was found to be necessary when the system was checked against the paradigm of the essential elements of teacher classroom behavior. This addition must be subjected to further testing. However, there was no indication of needed modifications for the purposes of this present study.

The Stimulate sub-category requires more critical definition so that some of those behaviors without observable relationship to the extension of the content or process of a lesson formerly coded under DEVELOP-Stimulate could more logically find a place under the REGULATE category. A new sub-category might include those behaviors whose function is to involve and maintain the student or students in the class activity.

Within the ADMINISTER category, the sub-category Routinize must be checked further to determine whether or not it is adequately defined and sufficient to classify those administrative behaviors which proved difficult to code under the system of classification tested by this study.

Considerable attention needs to be given to clarifying the distinctions between sub-categories of the DEVELOP category. The distinctions between Explain and Inform, Elicit and Check, and Reinforce-Explain-Inform need special attention. It may well prove necessary to expand the sub-categories and extend the system of classification to a third level of behavior.

There is need for revision of the concept of encounter. The inability of the observers to be certain about the beginning and the duration of an encounter caused considerable confusion. While no attempt was made to quantify the encounter during the development and adequacy testing of the system of classification, the project staff came to recognize that further clarification of the unit being coded would improve the reliability of the coding. Some method of checking the ability of coders to identify the length and frequency of encounters, during the training period before inauguration of actual coding procedures, may assist in pinpointing the difficulties experienced in regard to this factor.

Procedures.--The procedures for collecting data and using the instrument must be modified to fit the special uses to which the system of classification may be put. It is recommended that adequacy testing of further refinements of the system of classification make use of typescripts of the oral behavior which have been coded to coincide with the categorization of the live or filmed behavior. This, coupled with the use of a projector with a reverse and slow motion mechanism, would greatly facilitate the resolution of differences in coding based solely on misunderstanding of both verbal and non-verbal behaviors.

Less reliance upon timed-interval coding and more attention to the development of a composite picture based on different codings to be checked against a timed-interval observation are suggested by experience with the taxonomy.

Possible Future Research.--There is growing conviction among several investigators that to understand teaching and learning, efforts must be focused on the further illumination of the dynamics of the classroom. The procedures and approaches used by different researchers to study this problem vary widely, but at the present state of knowledge about teaching-learning, this variety is both reasonable and desirable. Currently there is insufficient data to support strong knowledge claims about teacher-learner interaction.

A system of classification and description of middle-range teacher behaviors has resulted from this research endeavor. Middle-range behaviors are not specific or discrete in nature. Rather, they are composed of any number of specific behaviors. For example, the subcategory of the taxonomy, Elicit, might include such specific behaviors as posing an open question to a group, posing a closed question to one student, asking for a show of hands, etc. Employing the classification system as it now stands, data of a more precise nature could be gathered in a reliable fashion, some tentative theoretical postulations could be formulated, and operational paradigms developed. What is needed is an extension of the system to encompass more discrete behaviors and a body of descriptive data that will provide knowledge of the relationship between a specific teacher behavior and the response possibilities and probabilities of learners, i.e., empirically validated relationships between a taxonomy of teacher behavior and a taxonomy of learner behavior.

Knowledge of these relationships must be determined before the content and experiences needed to develop effective teaching skills can be identified and organized into programs of teacher preparation. Therefore, what is required is a concerted effort to develop a knowledge base for the education of teachers through the careful empirical study and analysis of the dynamics of teacher-learner interaction. The taxomomy is one step toward making it possible to gather such data from which strong knowledge claims might ultimately result.

BIBLIOGRAPHY

Anderson, H. (ed.) Creativity and Its Cultivation. New York: Harper and Brothers, 1959, 132, 136.

Anderson, H., and Brewer, E. Studies of Teachers' Classroom Personalities, I: Dominative and Socially Integrative Behavior of Kindergarten Teachers. Applied Psychology Monographs, 1945, No. 6.

________. Studies of Teachers' Classroom Personalities, II: Effects of Teachers' Dominative and Integrative Contacts on Children's Classroom Behavior. Applied Psychology Monographs, 1946, No. 8.

Bales, R. F. Interaction Process Analysis. New York: Addison-Wesley, 1950.

Barr, A. S. Teacher Effectiveness: A Summary of Investigations. Madison, Wisconsin: Dembar Publications, Inc., 1961.

Bellack, A. A., Davitz, J. R., in collaboration with Kliebard, H. M., and Hyman, R. T. The Language of the Classroom: Meanings Communicated in High School Teaching. New York: Teachers College, Columbia University (U.S. Office of Education Cooperative Research Project No. 1497), 1963.

Clark, D. L., and Cyphert, F. R. "Teacher Behavior As a Conceptual Base for the Professional Education of Teachers." Paper read at Advisory Council, Associated Organization for Teacher Education, January, 1963.

Cornell, F. G., Lindvall C. M., and Saupe, J. L. An Exploratory Measurement of Individualities of Schools and Classrooms. Urbana: Bureau of Educational Research, University of Illinois, 1952.

Domas, S. J., and Tiedeman, D. V. "Teacher Competence: An Annotated Bibliography," Journal of Experimental Education, XIX (December, 1950), 99-218.

Flanders, N. A. "Personal-Social Anxiety as a Factor in Experimental Learning Situations," Journal of Educational Research, XLV (October, 1951), 100-110.

________. "Teacher and Classroom Influences on Individual Learning." Paper delivered at the Seventh Curriculum Research Institute of the A.S.C.D., 1961.

________. "Teacher Influence in the Classroom, Research on Classroom Climate." A paper delivered at Teachers College, Columbia University, April 14, 1962.

________. *Helping Teachers Change Their Behavior*. Ann Arbor School of Education, University of Michigan, 1963.

Getzels, J. W., and Jackson, P. W. "The Teacher's Personality and Characteristics," *Handbook of Research on Teaching*. American Educational Research Association. Edited by N. L. Gage. Chicago: Rand McNally, 1963.

Halpin, A. W. "A Paradigm for Research on Administrator Behavior," *in Administrative Behavior in Education*. Edited by Ronald F. Campbell and Russell T. Gregg. New York: Harper and Brothers, 1957.

Hughes, M. *Development of the Means for the Assessment of the Quality of Teaching in Elementary Schools*. Salt Lake City: University of Utah Press, 1959.

Lippitt, R., and White, R. K. "The 'Social Climate' of Children's Groups." *Child Behavior and Development*. Edited by R. G. Barker, J. S. Kounin, and H. F. Wright. New York: McGraw-Hill Book Co., 1943, 458-508.

Medley, D. M. and Mitzel, H. E. "Some Behavioral Correlates of Teacher Effectiveness." *Journal of Educational Psychology*, L (December, 1959), 239-246.

Miller, George L. *An Investigation of Teaching Behavior and Pupil Thinking*. Portion of a Thesis, University of Utah, May, 1964.

Mooney, R. L. "Nurturing the Educational Researcher as a Creative Artist." Occasional Paper 64-172. Bureau of Educational Research and Service, The Ohio State University, November, 1964.

Perkins, H. V. "Climate Influences Group Learning." *Journal of Educational Research*. XLV (October, 1951) 115-119.

Ryans, D. G. *Characteristics of Teachers*. Washington, D. C.: American Council on Education, 1962.

Smith, B. O. *Knowledge About Knowledge for Teachers*. University of Illinois, 1961. (Mimeographed.)

Smith, B. O., and Meux, Milton O. *A Study of the Logic of Teaching: A Report on the First Phase of a Five-Year Research Project*. Washington, D. C.: U.S. Office of Education, 1959. (Dittoed.)

Smith, B. O. *et al*. *A Tentative Report on the Strategies of Teaching*. Urbana: University of Illinois (U.S. Office of Educational Cooperative Research Project No. 1640), 1964.

Taba, Hilda, Levine, S., and Elzey, F. F. Thinking in Elementary School Children. San Francisco: San Francisco State College (U.S. Office of Education Cooperative Research Project No. 1574), 1964.

Travers, R. M. W. et al. Measured Needs of Teachers and Their Behavior in the Classroom. Final report on Office of Education Contract No. 444 (8029), 1961.

Withall, John. "Assessment of the Social-Emotional Climates Experienced by a Group of Seventh Graders as They Moved From Class to Class." Educational and Psychological Measurement. XII (Autumn, 1952), 440-451.

Wright, E. Muriel J., and Proctor, Virginia H. Systematic Observation of Verbal Interaction as a Method of Comparing Mathematics Lessons. St. Louis, Mo.: Washington University. (U.S. Office of Education Cooperative Research Project No. 816), 1961.

APPENDIX A

Appendix A

Pilot Study Instrument

I. Structure - Set the context and focus of subsequent subject matter and/or process.

Initiate - Introduce and launch an activity, task or area for study.

Order - Arrange elements of subject matter and/or process in a systematic manner.

Assign - Designate required activity.

II. Develop - Elaborate and extend within an established structure.

Inform - State facts, ideas, concepts, etc.

Explain - Show relationship between ideas, objects principles etc.

Summarize - Restate principal points in brief form.

Check - Elicit information concerning involvement or understanding

Reinforce - Confirm or sustain an idea, approach, or method through reiteration.

III. Administer - Execute tasks of classroom routine and procedure.

Manipulate - Arrange elements of the physical environment.

Manage Materiel - Provide or coordinate use of media, supplies, or materials.

IV. Regulate - Establish and maintain interpersonal relations.

Set Standard - Impose or guide development of standards of behavior.

Support - Express confidence, commendation, or empathy.

Restrict - Reprimand, threaten, punish, etc.

APPENDIX B

Appendix B

Pilot Study Coding Instructions

Before official coding begins all observers should complete the situation information on each sheet and make the necessary preparations suggested for each type of observation.

A series of four different types of observations will be made. Three of the series will be conducted under set times of 5, 10, and 15 seconds respectively. Having synchronized their initial observation, the observers will code the behavior of the teacher at the set time interval. Synchronization will be maintained by reference to the same time-piece.

FORM A: At each 5, 10, or 15-second interval the observed behavior of that moment will be coded by placing a check mark (✓) in the appropriate slot or slots, if Form A is used.

The source dimension (Originate or Respond) needs only to be checked when there is a change in source. The sign dimension must be checked at each time interval. In some cases two signs may be checked at a time. The function, or functions, of the sign should be checked in the same manner. However, a sign may be noted without determinable function. In such a case, use a zero (0) in the appropriate sign-time column.

Each page will be used for five minutes only. At the end of the five minutes turn to the next sheet and continue the same procedure. When observing at short intervals, it is necessary that all observers maintain the same rhythm of observation; therefore, prior to beginning observation, mark every sixth, or third column, with a red line for the 5- and 10-second observations respectively and every fourth line for the 15-second observations. Thus, the observer should be able to correct any deviation from the rhythm every 30 seconds for the 5- and 10-second observations and every minute for the 15-second observations by reference to the second hand of the master clock.

Since a given sign or function of behavior may extend for varying lengths of time, the shorter time intervals between coded observations may have repetitions of checks in the same categories.

FORM B: When using Form B, at each time interval (5, 10, 15 seconds) place the appropriate number on the grid which is provided as a recording sheet. Selection of the proper sign dimension on the left and the proper function across the top will provide the intersection block in which the number of the time interval should be placed. Beginning with one (1), each time interval should be numbered consecutively. For a five-minute observation at five-second intervals, the numbers 1 through 60 should be used. For a five-minute observation at ten-second intervals the numbers 1 through 30 should be used. These numbers should be placed vertically, beginning in the upper left-hand corner of the box made by the intersection of the columns and lines of the grid.

A separate page will be used for each five-minute observation. (Be sure pages are numbered consecutively before beginning observation.) The interval number should begin with one (1) on each new page, i.e., with the beginning of each five-minute observation unit.

When more than one sign and/or function occurs at the same time interval, the same number is used for that interval and placed in the appropriate function and sign categories. If a sign occurs without observable function, the number is written with a slash (/) through it under the proper sign category without concern for the function. Thus, Silence-Initiate grid with a $\cancel{6}$ means silence without observable function just as Silence-Opine $\cancel{6}$ means silence. The function column has no significance if a slash is placed through the number. In case of an error in coding, blacken out the number.

When the source dimension changes, it should be noted by drawing a circle (0) around the number if it is Teacher Originate encounter and underlining (_) if it is Teacher Respond behavior to a student or outside stimulant. Thue, Speak-Initiate grid with a ⑥ (six circled) means the teacher initiated something by speaking, and it appears the teacher served as the source of the behavior at the sixth time interval. A $\underline{6}$ (six underlined) in the same space would mean the behavior was in response to some discernible aspect of the classroom setting.

The fourth type observation has no set time at which behavior is coded. Instead, the observer concentrates on the functions and behaviors, and codes all that he observes in the order it occurs by placing numbers consecutively in the proper boxes formed by the grid. In this case, the numbers stand for consecutive occurences rather than consecutive time intervals. There is no need to code the duration of a behavior, only the sequence of behavior. Form B should be used for coding this type observation. The instructions given for Form B time-interval type observation should be followed, also. The same system of coding for Teacher Originate, (circling number), Teacher Respond (underlining number), and sign dimension only (slash through number) and error in coding (blacken out error) should be used.

APPENDIX C

FORM A-10

TIME	SOURCE		SIGN					STRUCTURE			DEVELOP					ADMINISTER		REGULATE			EVALUATE			TIME
	ORIGINATE	RESPOND	SPEAK	GESTURE	SHOW	WRITE	SILENCE	INITIATE	ORDER	ASSIGN	INFORM	EXPLAIN	SUMMARIZE	CHECK	REINFORCE	MANIPULATE	MANAGE MATERIEL	SET STANDARD	SUPPORT	RESTRICT	APPRAISE	OPINE	STEREOTYPE	
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Observer's
Initials

Sec. 2

Sec. 1

FORM A-15

TIME	SOURCE		SIGN					STRUCTURE			DEVELOP					ADMINISTER		REGULATE			EVALUATE			TIME
	ORIGINATE	RESPOND	SPEAK	GESTURE	SHOW	WRITE	SILENCE	INITIATE	ORDER	ASSIGN	INFORM	EXPLAIN	SUMMARIZE	CHECK	REINFORCE	MANIPULATE	MANAGE MATERIEL	SET STANDARD	SUPPORT	RESTRICT	APPRAISE	OPINE	STEREOTYPE	
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Subject______

Sec. 2

Sec.

FORM B

Function / Sign	STRUCTURE			DEVELOP					ADMINISTER		REGULATE	
	Initiate	Order	Assign	Inform	Explain	Summarize	Check	Reinforce	Manipulate	Manage Materiel	Set Standard	Support
Speak												
Gesture												
Show												
Write												
Silence												

F O R M B

Sec.

RE		DEVELOP					ADMINISTER		REGULATE			EVALUATE		
	Assign	Inform	Explain	Summarize	Check	Reinforce	Manipulate	Manage Materiel	Set Standard	Support	Restrict	Appraise	Opine	Ster type

Sheet No.__________
Date__________
Time Interval______
Grade Level_______
Subject__________
Observ. Initials____

APPENDIX D

Appendix D

Validation Study Instrument

Function Dimensions

I.	Structure	- Set the context and focus of subsequent subject matter and/or process.
	Initiate	- Introduce and launch an activity, task, or area for study.
	Order	- Arrange elements of subject matter and/or process in a systematic manner.
	Assign	- Designate required activity.
II.	Develop	- Elaborate and extend within an established structure.
	Test	- Conduct a quiz or examination--dictate questions, supply answers, without explanation.
	Elicit	- Solicit a verbal response that states facts, ideas, concepts, etc.
	Check	- Request information concerning understanding.
	Inform	- State facts, ideas, concepts, etc.
	Explain	- Show relationship between ideas, objects, principles, etc.
	Summarize	- Restate principal points in brief form.
	Reinforce	- Confirm or sustain an idea, approach, or method through reiteration.
	Stimulate	- Foster student involvement and participation.
III.	Evaluate	- Ascertain the relevance or correctness of subject matter and/or process.
	Appraise	- Verify by appeal to external evidence or authority.
	Opine	- Judge on the basis of personal values and beliefs.
	Stereotype	- React without stated reference to criteria.

IV. Administer - Execute tasks of classroom routine and procedure.

Manipulate - Arrange elements of the classroom environment, personal and physical.

Manage Materiel - Provide or coordinate use of media, supplies, or materials.

Proctor - Monitor classroom during group activity, testing, student teacher performance, etc.

V. Regulate - Establish and maintain interpersonal relations.

Set Standard - Impose or guide development of standards of behavior.

Support - Express confidence, commendation, or empathy.

Restrict - Reprimand, threaten, punish, etc.

Inquire - Ascertain student involvement.

Assist - Provide personal help; does for.

Monitor-Self - Recognize and interpret teacher's behavior.

APPENDIX E

Appendix E

Validation Study Coding Instructions

On the basis of the report of experiences with the forms for coding and the coding instructions developed for the field study of the first instrument at the University of Arizona the original instructions were revised and the system of coding modified. The coding instructions used in the validation study follow.

Coding Instructions

Before official coding begins all observers should complete the situation information on each sheet and make the necessary preparations suggested for each type observation. If the information is not available before previewing the films, it should be obtained during the preview. Particular care should be taken to maintain the proper sequence in coding sheets.

A series of three different types of observation will be made for coding purposes. The coding teams may preview any part or all of the film prior to coding. The preview provides opportunity to "get a feel" for the kind of teaching to be categorized, orients the observer with respect to the topic, and alerts the observer to any specific problems of observation, i.e., poor sound reproduction, discontinuous reproduction of classroom activity, complexity of teacher behavior, etc.

Two of the series of observations will be conducted under set times of 15 and 10 seconds respectively. Synchronization of observation intervals will be maintained by use of a tape-recorded announcement of the time period prepared for this purpose. The initial frame of the kinescope following the introductory credits will be used as the starting point and the behavior will be coded according to what is occurring at the set time interval.

Two forms will be used, Form A and Form B. Form A is produced in two colors for convenience in handling the data after coding. Both the yellow and blue sheets have identical data. The yellow sheet will be used for 15-second intervals and thus cover a seven and one-half minute time period while the blue sheets will be used for 10-second intervals and extend over a five-minute period only.

Form A: At each 10- or 15-second interval the observed behavior of that moment will be coded by placing a check mark (✓) in the appropriate slot or slots. The source dimension (Originate or Respond) needs only to be checked when there is a change in source. After the observation is completed all frames may be checked. The sign dimension must be checked at each time interval. In some cases two signs may be checked at a time. The function or functions, of the sign should be checked in the same manner. However, a sign may be noted without determinable function. In such a case, use a zero (0) in the appropriate sign-time column.

Each sheet will accommodate only thirty time-intervals. At the end of one sheet continue on to the next sheet with the same procedure until the end of the kinescope. Occasionally, a check should be made of the number of the time column to be certain that synchronization is being maintained with the taped numbers.

Since a given sign or function of behavior may extend over varying lengths of time, the shorter the time-interval between coded observations the greater the possibility of repetition of checks within the same categories on continguous time columns.

Care must be exercised when coding behavior to categorize functions according to gross categories before selecting the particular type of behavior within the larger category. For example, if a behavior which satisfies the definition of eliciting behavior is noted, care must be exercised to determine that the function of the behavior is developmental rather than structural, regulative, etc. If it is structural, it must be categorized under that broad rubric rather than the superficially obvious eliciting function which is limited by definition to the larger division of activity, develop.

Form B: This form consists of a grid formed by the intersection of the function categories and the sign categories. It is used in untimed observations when all teacher behavior is being categorized in order of its occurrence. The observer concentrates on the functions and behaviors, and codes all that he observes in the order in which it occurs by placing numbers consecutively in the proper boxes formed by the grid. In this case the numbers stand for consecutive occurrences rather than consecutive time-intervals. There is no need to code the duration of a behavior, only the sequence of behavior. Each change of function and/or sign is categorized by a different number in order of appearance. Each sheet should begin with the number 1 and continue until a particular grid is filled with numbers or until the number 60 or 70 is reached. Experience has shown that it is much easier to use numbers smaller than sixty. The appropriate number (in sequence) is placed in the intersecting block provided by the intersection of the perpendicular functional column and the horizonal sign column.

When more than one sign and/or function occurs at the same time, the same number is used for the compound occurrence and placed in the appropriate function and sign categories. If a sign occurs without observable function, the number is written with a slash (/) through it under the proper sign category without concern for the function. Thus Silence-Initiate grid with an $\cancel{8}$ means silence without observable function just as Silence-Elicit $\cancel{8}$ means silence. The function column has no significance if a slash is placed through the number. In case of an error in coding, blacken out the number.

When the source dimension changes, it should be noted by drawing a circle (0) around the number if it is Teacher Originate encounter and underlining (_) if it is Teacher Respond behavior to a student or outside stimulant. Thus, Speak-Initiate grid with a ⑥ (six circled) means the teacher initiated something by speaking and it appears the teacher served as the source of the behavior at the sixth time interval. A $\underline{6}$ (six underlined) in the same space would mean the behavior was in response to some discernible aspect of the classroom setting.

Because this less structured observation (in terms of time) is more difficult to do, it is suggested that the first observation be for 15 seconds, followed by the 10-second observations and finally the untimed observations.

APPENDIX F

Appendix F
Validation Study Observation Forms

FORM A - 10 SECONDS

	SOURC		SIGN						STR.			DEVELOP								EVAL.			REGULATE						ADMIN.		
TIME	ORIGINATE	RESPOND	SPEAK	READ	GESTURE	PERFORM	WRITE	SILENCE	INITIATE	ORDER	ASSIGN	TEST	ELICIT	CHECK	INFORM	EXPLAIN	SUMMARIZE	REINFORCE	STIMULATE	APPRAISE	OPINE	STEREOTYPE	SET. STAND.	SUPPORT	RESTRICT	INQUIRE	ASSIST	MONITOR-SELF	MANIPULATE	MANAGE MATERIEL	PROCTOR
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Sec. 2

Sheet Number ____________________
Time Interval ____________________
Subject ____________________

Date ____________________
Grade Level ____________________
Observer's Name ____________________

Sec. 1

FORM A - 15 SECONDS

SOURCE			SIGN						STR.			DEVELOP								EVAL.			REGULATE						ADMIN.			
TIME	ORIGINATE	RESPOND	SPEAK	READ	GESTURE	PERFORM	WRITE	SILENCE	INITIATE	ORDER	ASSIGN	TEST	ELICIT	CHECK	INFORM	EXPLAIN	SUMMARIZE	REINFORCE	STIMULATE	APPRAISE	OPINE	STEREOTYPE	SET. STAND.	SUPPORT	RESTRICT	INQUIRE	ASSIST	MONITOR-SELF	MANIPULATE	MANAGE	MATERIEL	PROCTOR
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Sec. 2

Sheet Number ____________________
Time Interval ____________________
Subject

Date ____________________
Grade Level ____________________
Observer's Name

Sec. 1

FORM B - UNTIMED

Function / Sign	STRUCTURE			DEVELOP								EVALUATE			REGULATE					
	INITIATE	ORDER	ASSIGN	TEST	ELICIT	CHECK	INFORM	EXPL.	SUM.	REINF.	STIMU.	APP.	OPINE	STEREO.	SET	SUP	REST	INQ.	ASSIST	
SPEAK																				
READ																				
GESTURE																				
PERFORM																				
WRITE																				
SILENCE																				

Sec. 2

E	DEVELOP								EVALUATE			REGULATE						ADMINISTER			
ASSIGN	TEST	ELICIT	CHECK	INFORM	EXPL.	SUM.	REINF.	STIMU.	APP.	OPINE	STEREO.	SET	SUP	REST	INQ.	ASSIST	MON.	MANI.	MGT. MAT.	PROCTOR	

APPENDIX G

Table 12

Intra-Team Frequency and Percentage of Codings of Function Categories at 15-Second Intervals

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English - Grade 3										
Team I	1/4	25.0	54/62	87.1	0/1	00.0	5/7	71.4	25/26	96.2
Team II	4/4	100.0	49/54	90.7	4/6	66.7	13/16	81.3	26/31	83.9
English - Grade 12										
Team I	13/13	100.0	16/16	100.0	7/7	100.0	2/2	100.0	4/4	100.0
Team II	16/16	100.0	9/9	100.0	2/2	100.0	22/23	95.7	2/2	100.0
English - College										
Team I	0/0	-----	37/39	94.9	5/5	100.0	3/3	100.0	7/7	100.0
Team II	0/0	-----	41/41	100.0	5/5	100.0	10/10	100.0	5/5	100.0
Math - Grade 4										
Team I		-----	48/50	96.0	8/10	80.0	12/13	92.3	25/25	100.0
Team II		-----	46/47	97.9	12/12	100.0	21/21	100.0	29/29	100.0
Math - Grade 6										
Team I	2/2	100.0	38/39	97.4	3/3	100.0	24/24	100.0	18/19	94.7
Team II	5/5	100.0	34/34	100.0	3/3	100.0	35/36	97.2	14/17	82.4
Math - Grade 8										
Team I	7/7	100.0	55/56	98.2	6/6	100.0	13/13	100.0	17/17	100.0
Team II	10/10	100.0	53/53	100.0	5/5	100.0	33/33	100.0	17/18	94.4
Math - Grade 9										
Team I	15/16	93.8	67/71	94.4	5/5	100.0	7/9	77.8	46/53	86.8
Team II	15/15	100.0	66/66	100.0	4/4	100.0	17/17	100.0	48/50	96.0

Table 12-- Continued

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Math - College										
Team I	0/0	-----	41/41	100.0	0/0	-----	4/4	100.0	31/32	96.9
Team II	0/0	-----	37/38	97.4	1/1	100.0	9/10	90.0	19/23	82.6
Phys.Ed.-Elementary										
Team I	0/0	-----	25/25	100.0	1/1	100.0	31/32	96.9	39/40	97.5
Team II	0/0	-----	35/36	97.2	12/13	92.3	41/45	91.1	20/21	95.2
Science - Grade 5										
Team I	0/0	-----	42/43	97.7	9/9	100.0	9/10	90.0	42/43	97.7
Team II	2/2	100.0	53/53	100.0	4/4	100.0	26/26	100.0	27/28	96.4
Biology - Grade 10										
Team I	0/0	-----	19/19	100.0	0/0	-----	15/17	88.2	31/34	91.2
Team II	3/5	60.0	13/17	76.5	1/2	50.0	13/18	72.2	28/34	82.4
Physics - Grade 12										
Team I	8/10	80.0	66/69	95.7	1/1	100.0	3/3	100.0	37/40	92.5
Team II	18/21	85.7	52/57	91.2	8/11	72.7	0/3	00.0	26/30	86.7
Shorthand I - Grade 11										
Team I	2/2	100.0	23/24	95.8	2/2	100.0	7/7	100.0	26/26	100.0
Team II	1/1	100.0	27/27	100.0	0/0	-----	12/12	100.0	12/12	100.0
Shorthand II - Grade 11										
Team I	2/2	100.0	58/58	100.0	0/0	-----	7/7	100.0	54/55	98.2
Team II	1/1	100.0	53/54	98.1	1/1	100.0	18/18	100.0	32/32	100.0
Social Studies - Grade 5										
Team I	6/6	100.0	54/55	98.2	3/3	100.0	14/15	93.3	42/43	97.7
Team II	7/7	100.0	48/49	98.0	2/2	100.0	22/22	100.0	31/32	96.9

Table 12 -- Continued

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Social Studies - Core										
Team I	3/3	100.0	22/22	100.0	4/4	100.0	11/11	100.0	9/9	100.0
Team II	4/4	100.0	23/24	95.8	9/9	100.0	12/13	92.3	6/6	100.0
Geography - Grade 8										
Team I	4/4	100.0	19/19	100.0	5/6	83.3	22/22	100.0	20/20	100.0
Team II	4/4	100.0	25/25	100.0	8/8	100.0	17/17	100.0	21/22	95.5
Social Studies - Grade 9										
Team I	39/40	97.5	74/75	98.7	7/7	100.0	2/4	50.0	32/33	97.0
Team II	28/29	96.6	75/76	98.7	16/16	100.0	12/12	100.0	36/36	100.0
Social Studies - Grade 12										
Team I	25/26	96.2	45/45	100.0	9/9	100.0	2/2	100.0	24/25	96.0
Team II	30/31	96.8	35/35	100.0	5/5	100.0	16/16	100.0	21/21	100.0
Spanish - Grade 3										
Team I	15/15	100.0	54/57	94.7	0/0	-----	10/13	76.9	9/9	100.0
Team II	15/17	88.2	60/66	90.9	0/0	-----	16/21	76.2	11/14	78.6
Totals I	142/150	94.7	857/885	96.8	75/79	94.9	203/218	93.1	538/560	96.1
II	163/172	94.8	834/861	96.9	102/109	93.6	365/389	93.8	431/463	93.1
Grand Total										
Team I	1815/1892	95.9								
Team II	1895/1994	95.0								

Table 13

Intra-Team Frequency and Percentage of Codings of Function Categories at 10-Second Intervals

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English - Grade 3										
Team I	3/3	100.0	54/59	91.5	4/6	66.7	13/16	81.3	32/36	88.9
Team II	2/2	100.0	60/60	100.0	6/6	100.0	34/34	100.0	49/49	100.0
English - Grade 12										
Team I	19/19	100.0	22/22	100.0	8/8	100.0	6/6	100.0	10/10	100.0
Team II	21/21	100.0	7/7	100.0	4/4	100.0	39/39	100.0	2/2	100.0
English - College										
Team I	1/1	100.0	61/62	98.4	2/3	66.7	3/5	60.0	9/9	100.0
Team II	0/0	-----	58/61	95.1	9/9	100.0	15/17	88.2	4/4	100.0
Math - Grade 4										
Team I	0/0	-----	66/69	95.7	10/10	100.0	14/15	93.3	46/53	86.8
Team II	1/1	100.0	64/66	97.0	9/10	90.0	24/24	100.0	47/49	95.9
Math - Grade 6										
Team I	5/5	100.0	54/55	98.2	2/2	100.0	36/36	100.0	28/28	100.0
Team II	9/9	100.0	54/56	96.4	3/3	100.0	45/45	100.0	21/24	87.5
Math - Grade 8										
Team I	6/7	85.7	41/43	95.3	2/3	66.7	16/17	94.1	17/17	100.0
Team II	4/4	100.0	45/45	100.0	2/2	100.0	25/25	100.0	9/10	90.0
Math - Grade 9										
Team I	19/20	95.0	115/120	95.8	5/6	83.3	10/15	66.7	68/88	77.3
Team II	22/22	100.0	95/95	100.0	10/10	100.0	26/26	100.0	81/83	97.6

Table 13 --Continued

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Math - College										
Team I	0/0	-----	61/61	100.0	0/0	-----	4/4	100.0	37/38	97.4
Team II	0/0	-----	49/50	98.0	3/3	100.0	21/21	100.0	27/29	93.1
Phys. Ed. - Elementary										
Team I	0/0	-----	47/47	100.0	4/4	100.0	57/58	98.3	31/31	100.0
Team II	0/0	-----	39/39	100.0	9/9	100.0	88/89	98.9	17/18	94.4
Science - Grade 5										
Team I	0/0	-----	72/73	98.6	12/12	100.0	13/13	100.0	59/63	93.7
Team II	2/2	-----	61/64	95.3	13/14	92.9	35/37	94.6	50/51	98.0
Biology - Grade 10										
Team I	5/5	100.0	32/37	86.5	1/2	50.0	25/26	96.2	48/53	90.6
Team II	2/2	100.0	26/26	100.0	4/6	66.7	30/30	100.0	50/60	83.3
Physics - Grade 12										
Team I	29/30	96.7	95/95	100.0	6/7	85.7	10/10	100.0	67.72	93.1
Team II	43/51	84.3	95/109	87.2	20/24	83.3	11/17	64.7	53/59	89.8
Shorthand II - Grade 11										
Team I	0/0	-----	90/91	98.9	1/1	100.0	9/10	90.0	94/94	100.0
Team II	0/0	-----	90/91	98.9	3/3	100.0	19/19	100.0	70/70	100.0
Social Studies - Grade 5										
Team I	14/14	100.0	68/73	93.2	5/6	83.3	24/30	80.0	42/49	85.7
Team II	16/16	100.0	55/74	74.3	1/1	100.0	29/30	96.7	22/24	91.7
Social Studies - Core										
Team I	0/0	-----	37/37	100.0	10/10	100.0	20/20	100.0	15/15	100.0
Team II	36/36	100.0	37/37	100.0	14/15	93.3	15/16	93.8	7/7	100.0

Table 13 --Continued

	Structure Freq.	Structure %	Develop Freq.	Develop %	Evaluate Freq.	Evaluate %	Regulate Freq.	Regulate %	Administer Freq.	Administer %
Geography - Grade 8										
Team I	5/5	100.0	34/35	97.1	7/7	100.0	29/30	96.7	33/38	86.8
Team II	13/14	92.9	34/34	100.0	11/12	91.7	26/26	100.0	40/40	100.0
Social Studies - Grade 9										
Team I	50/51	98.0	67/70	95.7	24/25	96.0	38/40	95.0	21/24	87.5
Team II	47/47	100.0	98/101	97.0	19/20	95.0	18/18	100.0	50/53	94.3
Social Studies - Grade 12										
Team I	46/47	97.9	47/51	92.2	8/8	100.0	6/6	100.0	22/30	73.3
Team II	55/58	94.8	48/50	96.0	0/0	-----	11/11	100.0	28/30	93.3
Spanish - Grade 3										
Team I	26/26	100.0	96/100	96.0	0/0	-----	57/60	95.0	12/13	92.3
Team II	27/27	100.0	103/105	98.1	0/0	-----	56/63	88.9	16/17	94.1
Totals										
Team I	$\frac{228}{233}$	97.9	$\frac{1159}{1200}$	96.6	$\frac{111}{120}$	92.5	$\frac{390}{417}$	93.5	$\frac{691}{761}$	90.8
Team II	$\frac{300}{312}$	96.2	$\frac{1118}{1170}$	95.6	$\frac{140}{151}$	92.7	$\frac{567}{587}$	96.6	$\frac{643}{679}$	94.8
Grand Totals										
Team I	$\frac{2579}{2731}$	94.4								
Team II	$\frac{2768}{2899}$	95.5								

Table 14

Inter-Team Frequency and Percentage of Codings of Function by Categories at 15-Second Intervals

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English - Grade 3	1/5	20.0	42/59	71.2	1/4	25.0	7/13	53.8	23/32	71.9
English - Grade 12	12/17	70.6	10/16	62.5	1/8	12.5	2/11	18.2	1/3	33.3
English - College	-----	----	30/44	68.2	1/8	12.5	1/8	12.5	2/8	25.0
Math - Grade 4	-----	----	30/54	55.6	5/14	35.7	6/22	27.3	18/33	54.5
Math - Grade 6	2/5	40.0	20/37	54.1	0/7	0.0	16/33	48.5	5/20	25.0
Math - Grade 8	5/10	50.0	28/48	58.3	2/6	33.3	4/22	18.2	5/18	27.8
Math - Grade 9	5/22	22.7	44/71	62.0	0/6	0.0	4/17	23.5	22/60	36.7
Math - College	-----	----	32/45	71.1	0/1	0.0	2/12	16.7	14/34	41.2
Phys.Ed.-Elementary	-----	----	14/42	33.3	0/8	0.0	19/48	39.6	10/44	22.7
Science - Grade 5	-----	----	23/51	45.1	1/8	12.5	2/29	6.9	15/45	33.3
Biology - Grade 10	0/1	0.0	10/19	52.6	-----	----	10/16	62.5	25/32	78.1
Physics - Grade 12	4/22	18.2	41/67	61.2	1/8	12.5	0/2	0.0	22/43	51.2
Shorthand I Grade 11	0/3	0.0	17/27	63.0	0/1	0.0	4/12	33.3	4/17	23.5
Shorthand II, Grade 11	1/2	50.0	33/44	73.3	0/1	0.0	4/17	23.5	19/34	55.9

Table 14 --Continued

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Social Studies-Elementary	6/7	85.7	47/56	83.9	1/4	25.0	14/22	63.6	27/35	77.1
Core - Grade 7	2/5	40.0	12/22	54.5	1/10	10.0	4/12	33.3	0/6	0.0
Social Studies - Grade 8	1/6	16.7	15/23	65.2	0/12	0.0	11/21	52.4	12/22	54.5
Social Studies - Grade 9	19/46	41.3	42/90	46.7	1/17	5.9	1/10	10.0	17/41	41.5
Social Studies - Grade 12	16/36	44.4	27/44	61.4	3/10	30.0	2/14	14.3	11/29	37.9
Spanish - Grade 3	15/15	100.0	56/58	96.6	-----	----	13/19	68.4	8/10	80.0
Totals	89.202	44.1	573/917	62.5	18/133	13.5	125/360	34.7	260/566	45.9

Table 15

Inter-Team Frequency and Percentage of Codings of Function by Categories at 10-Second Intervals

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English - Grade 3	2/3	66.7	46/60	76.7	2/6	33.3	13/29	44.8	29/44	65.9
English - Grade 12	16/24	66.7	7/22	31.8	1/10	10.0	6/34	17.6	2/10	20.0
English - College	0/1	0.0	41/66	62.1	1/8	12.5	1/14	7.1	1/8	12.5
Math - Grade 4	0/1	0.0	49/71	69.0	3/10	30.0	7/24	29.2	32/52	61.5
Math - Grade 6	5/9	55.6	27/51	52.9	0/4	0.0	22/41	53.7	14/31	45.2
Math - Grade 8	3/7	42.9	33/47	70.2	1/4	25.0	7/24	29.2	1/14	7.1
Math - Grade 9	8/29	27.6	58/120	48.3	1/8	12.5	4/26	15.4	27/109	24.8
Math - College	-----	-----	35/64	54.7	0/3	0.0	1/20	5.0	13/43	30.2
Phys.Ed.-Elementary	-----	-----	20/55	36.4	0/12	0.0	39/85	45.9	9/28	32.1
Science - Grade 5	-----	-----	42/86	48.8	6/18	33.3	8/38	21.1	35/70	50.0
Biology - Grade 10	0/2	0.0	13/23	56.5	0/2	0.0	21/27	77.8	29/54	53.7
Physics - Grade 12	27/41	65.9	87/102	85.3	4/18	22.2	3/10	30.0	44/82	53.7
Shorthand II - Grade 11	-----	-----	65/75	86.7	0/2	0.0	5/15	33.3	49/83	59.0
Social Studies - Grade 5	14/16	87.5	66/73	90.4	1/5	20.0	22/33	66.7	19/37	51.4

Table 15 --Continued

	Structure		Develop		Evaluate		Regulate		Administer	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Core - Grade 7	0/6	0.0	8/15	53.3	0/9	0.0	4/10	40.0	0/1	0.0
Geography - Grade 8	5/14	35.7	27/38	71.1	2/14	14.3	20/29	69.0	27/39	69.2
Social Studies - Grade 9	27/65	41.5	44/102	43.1	6/34	17.6	12/46	26.1	15/46	32.6
Social Studies - Grade 12	41/60	68.3	39/54	72.2	0/7	0.0	5/15	33.3	12/42	28.6
Spanish - Grade 3	26/27	96.3	92/96	95.8	-----	----	48/70	68.6	11/15	73.3
Totals	174/305	57.0	799/1220	65.5	28/174	16.1	248/590	42.0	369/808	45.4
Grand Total	$\frac{1618}{3097}$	52.2								

Table 16

Adequacy estimates for the Function Dimension at 10-Second Observations Using Kinescopes.

	Total Instances of Categz.	Instances of Substitution	Instances of Non-Substitution	Degree of Adequacy
Eng.-Gr. 3	128	14	114	89.1
Eng.-Gr. 12	68	32	36	52.9
Reading-Coll.	77	20	57	74.0
Math.-Gr. 4	136	22	114	83.8
Math.-Elem.	115	21	94	81.7
Math.-Gr. 8	77	19	58	75.3
Math.-Gr. 9	253	39	214	84.6
Math.-Coll.	114	16	98	86.0
P.E.-Elem.	135	45	90	66.7
Science-Gr. 5	173	39	134	77.5
Biol.-Gr. 10	105	3	102	97.1
Physics-Gr. 12	289	14	225	94.1
Shorthand-Gr.11 Reel I	---	--	---	----
Shorthand-Gr.11 Reel II	164	11	153	93.3
Soc.Std.-Elem.*	155	9	146	94.2
Core-Jr.High	29	12	17	58.6
Geog.-Gr. 8	111	23	88	79.3
Soc. Stud.-Gr.9	213	80	133	62.4
Soc. Std.-Gr. 12	154	24	130	84.4
Spanish-Gr. 3*	208	0	208	100.0
Totals	2654	443	2211	83.3

Table 17

Adequacy estimates for the Function Dimension at 15-Second Observations Using Kinescopes.

	Total Instances of Categz.	Instances of Substitution	Instances of Non-Substitution	Degree of Adequacy
Eng.-Gr. 3	101	12	89	88.1
Eng.-Gr. 12	41	14	27	65.9
Reading-Coll.	46	12	34	73.9
Math.-Gr. 4	100	28	77	77.0
Math.-Elem.	80	21	59	73.8
Math.-Gr. 8	78	26	52	66.7
Math.-Gr. 9	153	23	130	85.0
Math.-Coll.	83	10	73	88.0
P.E.-Elem.	100	42	58	58.0
Science-Gr. 5	104	29	75	72.1
Biol.-Gr. 10	62	6	56	90.3
Physics-Gr. 12	116	26	90	77.6
Shorthand-Gr. 11 Reel I	45	14	31	68.9
Shorthand-Gr. 11 Reel II	87	12	75	86.2
Soc. Std.-Elem.*	116	8	108	93.1
Core-Jr.High	43	12	31	72.1
Geog.-Gr. 8	66	18	48	72.7
Soc.Std.-Gr. 9	150	54	96	64.0
Soc.Std.-Gr. 12	107	26	81	75.7
Spanish-Gr. 3*	101	1	100	99.0
Totals	1779	389	1390	78.1

Table 18

Frequency of Agreements and Disagreements by Filmed Sequences for 10-Second Observations

	Disagreements		Agreements	Total Instances of Categoriz.
	Substitutions	Omissions		
English - Grade 3	14	22	92	128
English - Grade 12	32	4	32	68
English - College	20	13	44	77
Math - Grade 4	22	23	91	136
Math - Grade 6	21	26	68	115
Math - Grade 8	19	13	45	77
Math - Grade 9	39	116	98	253
Math - College	16	49	49	114
Phys. Ed. - Elementary	45	22	68	135
Science - Grade 5	39	43	91	173
Biology - Grade 10	3	39	63	105
Physics - Grade 12	14	60	165	239
Shorthand I - Grade 11	--	---	---	---
Shorthand II - Grade 11	11	34	119	164

Table 18 --Continued

	Disagreements		Agreements	Total Instances of Categoriz.
	Substitutions	Omissions		
Social Studies - Elementary	9	24	122	155
Core - Jr. High	12	5	12	29
Geography - Grade 8	23	7	81	111
Social Studies - Grade 9	80	29	104	213
Social Studies - Grade 12	24	33	97	154
Spanish - Grade 3	0	31	177	208
Totals	443	593	1618	2654

Table 19

Frequency of Agreements and Disagreements by Filmed Sequences for 15-Second Observations

	Disagreements		Agreements	Total Instances of Categoriz.
	Substitutions	Omissions		
English - Grade 3	12	15	74	101
English - Grade 12	14	1	26	41
English - College	12	10	34	56
Math - Grade 4	23	18	59	100
Math - Grade 6	21	17	43	81
Math - Grade 8	26	8	44	78
Math - Grade 9	23	55	75	153
Math - College	10	24	48	82
Phys. Ed. - Elementary	42	15	43	100
Science - Grade 5	29	34	41	104
Biology - Grade 10	6	11	45	62
Physics - Grade 12	26	22	68	116
Shorthand I - Grade 11	14	7	25	46
Shorthand II - Grade 11	12	18	57	87

Table 19--Continued

	Disagreements		Agreements	Total Instances of Categoriz.
	Substitutions	Omissions		
Social Studies - Elementary	8	13	95	116
Core - Jr. High	12	12	19	43
Geography - Grade 8	18	9	39	66
Social Studies - Grade 9	54	16	80	150
Social Studies - Grade 12	26	22	59	107
Spanish - Grade 3	1	8	92	101
Totals	389	335	1066	1790

Table 20

The Frequency and Percent of Agreement and Disagreement For the Sign Dimension at 10-Seconds Observation

	Agreements		Disagreements				Totals	
			Omissions		Substitutions			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Speak	1616	56.2	91	23.5	23	13.4	1730	50.4
Read	58	2.0	2	0.5	20	11.6	80	2.3
Gesture	110	3.8	164	42.3	47	27.3	321	9.3
Perform	141	4.9	79	20.4	51	29.7	271	7.9
Write	57	2.0	52	13.3	30	17.4	139	4.0
Silence	892	31.1	0	0.0	1	0.6	893	26.1
Total	2874	100.0	388	100.0	172	100.0	3434	100.0

Table 21

The Frequency and Percent of Agreement and Disagreement For the Sign Dimension at 15-Seconds Observation

	Agreements		Disagreements				Totals	
			Omissions		Substitutions			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Speak	1128	53.6	62.	21.8	18	13.6	1208	47.9
Read	38	1.8	1	.4	18	13.6	57	2.3
Gesture	98	4.7	120	42.3	35	26.5	253	10.0
Perform	105	5.0	68	23.9	41	31.1	214	8.5
Write	52	2.5	33	11.6	20	15.2	105	4.2
Silence	685	32.4	0	0.0	0	0.0	685	27.1
Total	2106	100.0	284	100.0	132	100.0	2522	100.0

Table 22.

A Rank Order Listing of Composite Scores Of Adequacy Estimates for 10- and 15-Second Observations

Order	Film Sequence	Composite Scores
1	Spanish - Grade 3	199.0
2	Biology - Grade 10	187.4
3	Social Studies - Elementary	187.2
4	Shorthand II - Grade 11	179.5
5	English - Grade 3	177.2
6	Math - College	173.8
7	Physics - Grade 12	171.7
8	Math - Grade 9	169.6
9	Math - Grade 4	160.8
10	Social Studies - Grade 12	160.1
11	Math - Elementary	155.6
12	English - College	152.6
13	Geography - Grade 8	152.0
14	Science - Elementary	149.6
15	Math - Grade 8	142.0
16	Core - Jr. High	130.7
17	Social Studies - Grade 9	126.4
18	Physical Education - Jr. High	124.7
19	English - Grade 12	118.8

Table 23

Frequency and Percentages of Total Substitutions by Categories of Function Dimension at 10 Seconds

Category	Total Instances of Coding	Total Instances of Substitutions Between Categories	Per Cent of Substitutions	STRUCTURE		DEVELOP		EVALUATE		REGULATE		ADMINISTER	
				Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Structure	305	103	33.8			52	50.5	20	19.4	23	22.3	8	7.8
Develop	1220	315	25.8	52	16.5			71	22.5	157	49.8	35	11.1
Evaluate	174	130	74.7	20	15.4	71	54.6			31	23.8	8	6.2
Regulate	590	249	42.2	23	9.2	157	63.1	31	12.4			38	15.3
Administer	808	89	11.0	8	9.0	35	39.3	8	9.0	38	42.7		
Totals	3097	886	28.6	103	11.6 3.3	315	35.6 10.2	130	14.7 4.2	249	28.1 8.0	89	10.0 2.9

Table 24

Frequency and Percentages of Total Substitutions by Categories of Function Dimension at 15 Seconds

Category	Total Instances of Coding	Total Instances of Substitutions Between Categories	Per Cent of Substitutions	STRUCTURE		DEVELOP		EVALUATE		REGULATE		ADMINISTER	
				Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq	%
Structure	202	100	49.5			66	66.0	16	16.0	13	13.0	5	5.0
Develop	917	290	31.6	66	22.8			56	19.3	118	40.7	50	17.2
Evaluate	133	109	82.0	16	14.7	56	51.4			23	21.1	14	12.8
Regulate	359	182	51.0	13	7.1	118	64.8	23	12.6			28	15.4
Administer	568	97	17.1	5	5.2	50	51.5	14	14.4	28	28.9		
Totals	2179	778	35.7	100	12.9 4.6	290	37.3 13.3	109	14.0 5.0	182	23.4 8.4	97	12.5 4.5

Table 25

Frequency and Percentage of Intra-Category Substitutions Within the Function Dimension at 15-Seconds Observations

	Frequency	% of Total Intra-Sub.	Frequency	% of Total Intra-Sub.
Structure	11	4.3	33	9.7
Develop	220	86.3	250	73.5
Evaluate	2	0.8	14	4.1
Regulate	20	7.8	29	8.5
Administer	2	0.8	14	4.1
Totals	255	100.0	340	99.9

Functional Dimensions

I. Structure - Set the context and focus of subsequent subject matter and/or process.

Initiate - Introduce and launch an activity, task or area for study.

Order - Arrange elements of subject matter and/or process in a systematic manner.

Assign - Designate required activity.

II. Develop - Elaborate and extend within an established structure.

Test - Conduct a quiz or examination--dictate questions, supply answers, without explanation.

Elicit - Solicit a verbal response that states facts, ideas, concepts, etc.

Check - Request information concerning understanding.

Inform - State facts, ideas, concepts, etc.

Explain - Show relationship between ideas, objects, principles, etc.

Summarize - Restate principal points in brief form.

Reinforce - Confirm or sustain an idea, approach or method through reiteration.

Stimulate - Foster student involvement and participation.

III. Evaluate - Ascertain the relevance or correctness of subject matter and/or process.

Appraise - Verify by appeal to external evidence or authority.

Opine - Judge on the basis of personal values and beliefs.

Stereotype - React without stated reference to criteria.

IV. Administer - Execute tasks of classroom routine and procedure.

Manipulate - Arrange elements of the classroom environment, personal and physical.

Manage Materiel - Provide or coordinate use of media, supplies, or materials.

Proctor - Monitor classroom during group activity, resting, student teacher performance, etc.

V. Regulate - Establish and maintain interpersonal relations.

Set Standard - Impose or guide development of standards of behavior.

Support - Express confidence, commendation, or empathy.

Restrict - Reprimand, threaten, punish, etc.

Inquire - Ascertain student involvement.

Assist - Provide personal help; does for.

Monitor-Self - Recognize and interpret teacher's behavior.

TABLE 26

FREQUENCY OF SUBSTITUTIONS OF ONE FUNCTION FOR ANOTHER

10 SECOND

		STRUCTURE			DEVELOP								EVALUATE			REGULATE						ADMINISTER		
		INITIATE	ORDER	ASSIGN	TEST	ELICIT	CHECK	INFORM	EXPLAIN	SUMMARIZE	REINFORCE	STIMULATE	APPRAISE	OPINE	STEREOTYPE	SET STANDARD	SUPPORT	RESTRICT	INQUIRE	ASSIST	MONITOR SELF	MANIPULATE	MANAGE MATERIEL	PROCTOR
STRUCTURE	INITIATE		16			1	1	6		6				8		1							2	
	ORDER			17	2	10		9	5		7	3		10	1	9	1	2			3	5	1	
	ASSIGN						2							1		7								
DEVELOP	TEST					4	4	1	2	1	14	1			3	3						1		
	ELICIT						31	21	8	3	31	4		6	15	25	5	4	2	1	2	19		
	CHECK							4	3		7			1	2	11		1	1		3	3		
	INFORM								31	6	41	2	1	9	3	47	5		1		5	4		
	EXPLAIN									2	22	3		2	4	1	1			1	3	1		
	SUMMARIZE										2			2	1	1					1	1		
	REINFORCE											2		5	9	12	3	3				6		
	STIMULATE													8		14					1			
EVALUATE	APPRAISE													11		1			1					
	OPINE														3	8	4	1	3		1	2		
	STEREOTYPE															10	1	2			2	6		
REGULATE	SET STANDARD																5	6	4	1	7	28	1	
	SUPPORT																	2		1		5		
	RESTRICT																			1	1			
	INQUIRE																				1	1		
	ASSIST																					1		
	MONITOR SELF																					2		
ADMINISTER	MANIPULATE																						13	
	MNG. MATERIEL																							1
	PROCTOR																							

TABLE 27

FREQUENCY OF SUBSTITUTIONS OF ONE FUNCTION FOR ANOTHER

15 SECOND

		STRUCTURE			DEVELOP								EVALUATE			REGULATE						ADMINISTER		
		INITIATE	ORDER	ASSIGN	TEST	ELICIT	CHECK	INFORM	EXPLAIN	SUMMARIZE	REINFORCE	STIMULATE	APPRAISE	OPINE	STEREOTYPE	SET STANDARD	SUPPORT	RESTRICT	INQUIRE	ASSIST	MONITOR SELF	MANIPULATE	MANAGE MATERIEL	PROCTOR
STRUCTURE	INITIATE		5			1		3		3				3		1								
	ORDER			6	2	12	4	12	4	5	10	4	1	10	2	10	1				1	4		
	ASSIGN					1		1	2	1		1										1		
DEVELOP	TEST					7		1			1					5			1			2		
	ELICIT						32	12	4	1	32	7	1	3	10	22	9	5	2	2	4	20		
	CHECK							1	1		6	2		1	1	2					1	2		
	INFORM								47	5	25	3	4	4	6	20	2				6	13	4	
	EXPLAIN									1	18	2	1	4	1	6	1	1		1	3	2		
	SUMMARIZE										9			3		1					1			
	REINFORCE											3	1	4	10	10	1	1			4	5		
	STIMULATE													2		6	2					2		
EVALUATE	APPRAISE																				1			
	OPINE														2	4	4	4			1	1		
	STEREOTYPE															3		2				13		
REGULATE	SET STANDARD																2	7	4	1	4	18	1	
	SUPPORT																		1			3		
	RESTRICT																				1	2		
	INQUIRE																							
	ASSIST																					1		
	MONITOR SELF																					3		
ADMINISTER	MANIPULATE																						2	
	MNG. MATERIEL																							
	PROCTOR																							